

**REPORT OF THE GOVERNOR'S AIR QUALITY
STRATEGIES TASK FORCE**

**RECOMMENDED LONG-TERM CONTROL MEASURES
FOR
OZONE, CARBON MONOXIDE, AND PM₁₀**

December 2, 1996

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SECTION I

INTRODUCTION

This report is about how Arizona can improve its air quality. Many measures in this report are pro-active and are specific to the clean air needs of our nonattainment areas. They reflect Arizona's desire to implement what is necessary for the health of our residents and visitors and are consistent with the direction already taken in numerous statutory and administrative measures which deal with air quality. The recommendations provided are the result of more than six months of intense work by a group of Arizona professionals, the Air Quality Strategies Task Force, who convened at the request of the Governor to help the State find specific, implementable ways to correct its air quality problems. The Task Force membership is as follows:

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Streich Lang, P.A.

The Honorable John Kaite
Arizona State Senate

Mr. Christopher J. Andrews
President, Andrews Environmental Management
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Salt River Project

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Ms. Sandy Black
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American Lung Association of Arizona

The Honorable Russell Bowers
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Mr. Charlie Stevens
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Representing Western States Petroleum
Association

Mr. Al Brown
Environmental Services Department Director,
Maricopa County

Mr. William Wiley
Environmental Policy Advisor
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This report is organized into four sections. Section I, the introduction, is intended to provide the reader a concise overview of the air quality history of the Phoenix urban area and a history of the Air Quality Strategies Task Force, as well as a guide to the rest of the report. A more detailed history of air quality issues is provided in Appendix A. Section II discusses the health and environmental effects of each of the three air pollutants studied in depth by the Task Force (i.e., ozone, carbon monoxide [CO], and particulate matter [PM]). The objective of Section III is to present the recommended control measures, and Section IV lists measures considered but not adopted by the Task Force. The remainder of this introduction will provide a description of the air quality problem, a history of the air quality campaign in Arizona, a description of Task Force activities, and a discussion of the consequences of failing to reduce pollutant concentrations.

WE'VE GOT A PROBLEM WITH OUR AIR

That is the slogan of Arizona's Clean Air Campaign. It is also clearly the belief of our citizens. In a poll conducted by West Group in the spring of this year, only crime was ranked ahead of air quality as the major quality-of-life concern of Valley residents. In a similar vein, a poll by the Phoenix Chamber of Commerce last summer showed that 51 percent of 175 business owners polled rated the Valley's air quality as poor or very poor. In addition, a poll taken last year of the 50 or so stakeholder groups represented on the Public Advisory Committee of the Arizona Comparative Environmental Risk Project concluded that of the 14 environmental issues facing the State, the only issue felt by the Committee to represent a high risk to the State's citizens was outdoor air quality.

Poor air quality is, however, more than a matter of mere perception. In fact, at monitoring locations located throughout the metropolitan area, the ozone standard was exceeded 26 times during the 1995 ozone season (i.e., summer) and seven times during the 1996 ozone season¹. In addition, in 1995 the CO standard was exceeded four times and the annual standard for PM was exceeded at two different monitors. A primary source of air quality problems is urban traffic. Nearly 60 million miles are driven in Phoenix every work day, and Phoenix traffic increases about three percent annually with resulting increases in vehicle emissions of about 2.7 percent.

The consequences of poor air quality are grave. The American Lung Association of Arizona estimates that nearly one million people are impacted by unhealthy air in the Valley. At-risk groups include people with asthma and chronic lung disease, children under 12, and adults over 65. The total includes approximately 40,000 children and 70,000 adults with asthma; 120,000 people who suffer from chronic obstructive pulmonary disease; 470,000 children under 12; and 300,000 adults over 65.

A SUMMARY OF STATE AND LOCAL EFFORTS TO CLEAN UP MARICOPA COUNTY'S AIR

In Appendix A to this report, the Task Force has provided a detailed history of Arizona's struggle to achieve cleaner air in its urban areas. This section summarizes that historical analysis.

¹It should be noted that not all exceedances constitute violations of the ozone standards, nor were all exceedances measured at federally recognized sites.

The federal Clean Air Act (CAA or the Act) was the first major piece of national regulatory legislation that was spawned by the environmental movement of the late 1960s. Since its enactment in 1970, the CAA has been amended on two occasions, in 1977 and 1990. In both instances, substantial changes to the CAA were necessary because the Act's deadlines were found to be unrealistic and the means to meet those deadlines were either insufficient or inappropriate. However, the basic structure of the Act has remained the same. The Environmental Protection Agency (EPA) adopts nationwide standards for safe levels of the pollutants that most of us breathe. The National Ambient Air Quality Standards or the NAAQS. The states are tasked with developing plans to attain and maintain those standards.

Beginning in 1972 the State began submitting or amending a series of State Implementation Plans or SIPs that described the methods which state and local officials in Maricopa County would use to achieve or maintain the NAAQS for ozone, CO, and what were then called total suspended particulates (TSP). As the CAA was amended to create new deadlines for attaining the NAAQS, new means were required for NAAQS attainment and the NAAQS were revised to reflect new scientific information, the SIP was amended accordingly. With each significant amendment to the SIP and EPA's action (or inaction) on the amendment, there was a judicial challenge by one or more environmental groups, usually lead by the Arizona Center for Law in the Public Interest, to the State's alleged lack of timeliness in submitting SIP amendments, EPA's decision to approve the SIP amendments when submitted or a perceived state and local unwillingness to carry out the measures in the SIP. In some cases these challenges were upheld by the courts. In other cases the challenges were rejected.

This pattern of federal mandate, State action in response to the mandate, challenge to the adequacy of State action, and federal or State response to the challenge, should not obscure the genuine progress toward cleaner urban air that the State has achieved since 1972. Indeed, Arizona has been a leader in its adoption not only of measures to deal with urban air problems, particularly those caused by mobile sources, but also in implementing programs that are discovering the causes of those problems.

- # Arizona was one of the first two states to institute a centralized vehicle emissions inspection program.
- # Arizona was one of the states that has pioneered the use of oxygenated gasoline to reduce CO emissions during the winter months and a reduction in the maximum allowable volatility of gasoline to reduce ozone-producing VOC emissions during the summer ozone season.
- # Arizona has one of the most comprehensive trip reduction ordinances in the country.
- # Arizona leads the nation in its adoption of sophisticated and accurate vehicle emissions testing and maintenance measures. The inspection and maintenance (IM) 240 and remote sensing programs.
- # Arizona was one of the first states to undertake a study to determine the exact cause of what the citizens of Maricopa County refer to as ~~A~~the Brown Cloud.®
- # Arizona has implemented a micro-scale study to identify the specific activities and land uses that contribute to elevated levels of PM₁₀ (particulate matter with aerodynamic diameter of 10 microns or smaller) in Maricopa County.

While several of the measures and studies described above were undertaken after prodding from the federal government or in response to judicial decisions, most of the initiatives were the result of a proactive stance by

State and local leaders based on the belief that the choice of the means to achieve cleaner air is best left to the citizens most affected by that choice. As rapid growth threatens to offset much of the progress that has been made toward cleaner urban air, State and local organizations like Maricopa County, Maricopa Association of Governments (MAG), and Arizona Department of Environmental Quality (ADEQ) are in the process of developing the new strategies that will be necessary to address air quality problems in Maricopa County. The creation of this Air Quality Strategies Task Force is but one component of what must be a sustained and increased effort to achieve cleaner air.

THE GOVERNOR'S AIR QUALITY STRATEGIES TASK FORCE

On May 24, 1996 Governor Fife Symington issued Executive Order 96-6 creating a Task Force charged with developing (1) recommended measures to avoid violations of ozone standards during the 1996 summer ozone season, and (2) strategies for implementing those measures. Because of the need for immediate action, the Task Force's initial report was submitted to the Governor on July 1, 1996. The actions that were proposed were limited to those that could be implemented within 30 to 45 days of the issuance of the report. Thus, the report relied primarily on voluntary measures. In addition to its July 1, 1996 deadline for recommending immediate ozone control measures, the Task Force was required by November 15, 1996 to recommend longer term measures to reduce the formation of ozone.

On July 16, 1996 Executive Order 96-6 was revised to broaden the mandate of the Task Force. The newly named Air Quality Strategies Task Force was asked to identify long-term strategies to reduce not only violations of the ambient air quality standards for ozone but also CO and PM₁₀.

Throughout August, September, and October, the Task Force considered long-term measures that would reduce the formation of ozone. During that period, the Task Force considered literally hundreds of suggestions by the general public, private businesses, and governmental entities. In addition, the Task Force collected a compendium of dozens of ozone control measures adopted by jurisdictions in every area of the country. In response to the expansion of its mandate, the Task Force created four subcommittees:

- # A Maricopa County Nonattainment Area Fuels Subcommittee to evaluate and report to the Task Force on the benefits, costs, and other issues raised by alternative gasoline formulations intended to reduce the emissions of VOCs and other ozone precursors from gasoline-powered vehicles and equipment.
- # A Carbon Monoxide Subcommittee to evaluate and recommend measures to reduce CO emissions.
- # A PM₁₀ Subcommittee to evaluate and recommend measures to reduce the emissions of inhalable particulate matter.
- # An After Market Consumer Products for Mobile Sources Subcommittee to evaluate the feasibility of having the State endorse particular commercial products or general categories of commercial products believed to reduce emissions from mobile sources.

The members of the CO and PM₁₀ subcommittees are listed in Appendix B.

All subcommittees but the Fuels Subcommittee were to report the results of their work to the Task Force by November 1. Because of the technical complexity of the issues being considered by the Fuels Subcommittee,

that Subcommittee was given until mid-November to complete its work and the deadline for the final report from the Task Force was consequently postponed until December 2.

In its consideration of pollution control measures by the subcommittees, the Task Force was faced with limitations on the kinds of measures it could propose. The primary constraint was an unwillingness to recommend measures that could not be implemented during the so-called compliance periods dictated by the CAA. One of the flaws of the CAA is the fact that it penalizes states and localities that adopt solutions to their air quality problems that take over five years to implement. Specifically, by automatically downgrading nonattainment areas that fail to achieve and maintain national ambient air quality standards within the three- to six-year compliance periods prescribed by the CAA, states and localities are discouraged from adopting pollution control measures that take longer than that period to become fully effective, even when those measures offer the most reliable, practicable, and cost-effective means of solving a particular locality's air quality problems. Thus, in their consideration of measures, the Task Force was faced with endorsing methods for the control of air pollution that emphasized changes in technology (which can be implemented within a relatively short period of time) rather than measures intended to produce changes in lifestyle (which typically take years to effectuate if they can be effectuated at all).

Since a primary cause of the ozone, CO and PM₁₀ problems in Maricopa County is mobile sources, the Task Force's emphasis on technology has generally meant the recommendation of measures that lower the quantity of pollutants that vehicles emit per mile, rather than calling for the implementation of measures that decrease miles traveled. The Task Force's embrace of a technology-based approach to air quality problems is consistent with the strategy for controlling mobile source emissions that has dominated the State's thinking for over 20 years. During that period, Arizona has been generally successful in reducing the number of violations of the ambient air quality standards for automobile-related pollutants, particularly CO, in Maricopa County as well as the severity of those violations. As a general matter, these results have been achieved by enhancing the beneficial effects of less-polluting vehicles with an increasingly sophisticated vehicle emissions inspection program and substantially less-polluting fuels.

Were Maricopa County an area with ordinary growth, the technological fixes the State has heretofore relied upon would probably be enough in the long run to reduce air pollution to a satisfactory level. Maricopa County is not such an area. Although cleaner vehicle strategies when combined with technological advances over the next several years may achieve our clean air goals, there is room for doubt. The reality is that vehicle miles traveled, both on an overall and per vehicle basis, continue to increase and these increases have the potential to overwhelm all of the technological strategies that are currently being implemented or that have been proposed in this report.

The decision whether to drive, how far to drive, and when to use the automobile is ultimately a decision of personal choice that is intertwined with other lifestyle decisions, including our choice of where we live, shop, and go to church. The Task Force has proposed measures to influence those decisions through, among other things, public outreach and employment-based trip reduction programs. These voluntary and quasi-voluntary approaches have demonstrated some measure of success.

Not considered by the Task Force, however, was the desirability of long-term measures that attempt to affect lifestyle decisions by more direct and less voluntary means. Specifically these include vigorous regional land use planning decisions; and increasing mass transit options and other measures to reduce urban sprawl, even including direct control of limits on growth. While consideration of these kinds of measures was outside the mandate of the Task Force, several members have expressed the strong belief that the only way we will be able

to effectively reduce air pollution in the coming years is for the State and local government to more pro-actively deal with growth and its adverse consequences by the adoption of integrated, regional land use and transportation planning and urban growth boundaries. Others on the Task Force, while agreeing that lifestyle changes may ultimately be required to effectively reduce urban air pollution, are uncomfortable with a greater role for government in what has heretofore been individual and market-based decision-making. From whatever perspective the problem is approached, however, there was consensus among the Task Force members that the State and local leadership must treat as a greater priority the ongoing consideration by a wide range of entities of how our political, social, and economic institutions should plan for growth. Land use and transportation planning are all elements of this consideration, but the underlying concerns must be whether the southwest lifestyle we all cherish is reconcilable with the direction that economic growth is taking us. If the two cannot be reconciled, what must change? Our lifestyle or our attitude toward growth?

A second, related constraint on the nature of the pollution control measures the Task Force considered is the practical inability to implement certain measures that require a significantly enhanced mass transit system. For example, a number of citizens urged the Task Force to adopt measures that limit parking in the downtown areas or areas of significant employment to discourage the use of single occupancy vehicles (SOVs). Other individuals suggested even more drastic measures to curb the use of SOVs including limiting the use of such vehicles on certain days of the week or during certain periods when pollution reaches unhealthy levels. These proposals raise significant issues.

The reality is, however, that limits on private vehicle usage, whether indirectly implemented through parking restrictions or more directly implemented through prohibitions or limitations on driving, are simply unworkable without an alternative to the private vehicle as a means of getting to work, to leisure activities, or to other destinations. The experience of Mexico City, in which a direct limitation on vehicle usage was attempted, bears out this conclusion. Thus, whatever the merit (or lack of merit) of increased mass transit as a stand alone means of decreasing vehicle usage (an issue considered by the Governor's Transportation Strategies Task Force), the failure to enhance the existing, limited mass transit system precludes the implementation of many measures that may be effective in reducing vehicle miles traveled.

CONSEQUENCES OF FAILURE TO ATTAIN THE NAAQS FOR OZONE

As a **moderate** nonattainment area, Phoenix was required to meet the ozone standard by November 15, 1996, i.e., no violations in 1994, 1995, or 1996. However, multiple violations occurred in 1995, and there has been no official determination of the number of violations during 1996. The area has implemented all EPA recommended measures, but unfortunately the full benefits of the measures take time to be realized. Phoenix is in danger of being reclassified as a **serious** nonattainment area, which carries significant regulatory and economic burdens. As an example, smaller industrial sources would become subject to much more stringent permitting requirements, making attraction of new business and expansion or retention of existing businesses more difficult. In addition, ADEQ would be required to submit a plan by September of 1998 showing the following:

- # A 3% per year reduction in emissions of ozone-forming chemicals
- # A forecast of traffic levels with annual updates for each year prior to attainment
- # New contingency measures to offset unanticipated growth in traffic
- # Any additional controls needed to demonstrate attainment no later than November 15, 1999 (i.e., no violations in 1997, 1998, and 1999)

These requirements present a dilemma. Disproportionate pollution control burden would fall on major industrial sources, which are not the controlling source of ozone pollution. In fact, mobile sources are the dominant

contributor to ozone pollution. Second, the area would have to avoid violations during the year before the new plan would be due (while the plan was still being prepared).

As early as late 1995, ADEQ and EPA began discussing alternatives to reclassification. Because Arizona has acted in good faith and represents a model of how to implement a successful enhanced vehicle emissions inspection program, EPA has been willing to work with the State on an alternative to reclassification. Arizona proposed an alternative to this reclassification through the development of a Voluntary Early Ozone Plan (VEOP). The VEOP will provide emission reductions above and beyond those currently planned, and bring Maricopa County into attainment within the ozone standard before the November 15, 1999 attainment date. Further, it will provide these emissions reductions without imposing the burdensome CAA requirements for serious areas. The plan provides for all of the safeguards contained in a SIP revision, including a modeling demonstration that will show how the emissions reductions will improve air quality, as well as guarantees of enforceability of the control programs. Wherever possible the control measures are performance-based, and rely on market mechanisms to create incentives for emissions reductions. The ozone reduction measures recommended by this report are consistent with and are intended to increase the effectiveness of the VEOP.

CONSEQUENCES OF FAILURE TO ATTAIN THE NAAQS FOR CARBON MONOXIDE

As noted previously, the one pollutant for which there has been a consistent record of improvement has been CO. Nevertheless, the Phoenix nonattainment area did not attain the CO NAAQS by the applicable date in the CAA for moderate CO areas, December 31, 1995. As a result, on August 28, 1996 the EPA reclassified the Phoenix nonattainment area from moderate to serious. The effect of the reclassification is to allow the State, per the provisions of the 1990 federal CAA Amendments, until February 27, 1998, or 18 months from August 28, 1996, to submit a new SIP. The SIP must demonstrate attainment of the CO NAAQS as expeditiously as practicable but no later than December 31, 2000. The SIP will be prepared through the cooperative effort of ADEQ, Arizona Department of Transportation (ADOT), Maricopa County, and MAG.

The new SIP must include the following:

- # Forecast of vehicle miles traveled (VMT) for each year before the attainment year and provisions for annual updates of these forecasts
- # Adopted contingency measures
- # Adopted transportation control measures and strategies to offset any growth in CO emissions from growth of VMT or number of vehicle trips

In addition, contingency measures in the moderate area plan for the Phoenix area must be implemented.

Should the State fail to meet the CO standard by December 31, 2000, the State then must submit a plan with a program of incentives that, in concert with other plan elements, will reduce the total tonnage of CO emissions by at least five percent annually after plan approval and before attainment of the CO standard.

Failure to submit an approvable plan in a timely manner or failure to comply with its plan, under Section 179 (b) of the CAA, EPA would impose sanctions on the State which include two-for-one emission offsets for industry and the loss of federal highway funds. According to ADOT, Arizona receives approximately \$257 million annually from the federal government for highway use. The CO control measures recommended in this report will

be incorporated in the SIP and will make a significant contribution toward attaining the NAAQS for CO by the December 31, 2000 attainment date.

CONSEQUENCES OF FAILURE TO ATTAIN THE NAAQS FOR PM₁₀

On June 7, 1995, EPA proposed to find that the Phoenix nonattainment area did not attain the PM₁₀ NAAQS by December 31, 1994, the applicable date in the CAA for moderate PM₁₀ areas. The State requested a one-year extension of the attainment date; however, due to a PM₁₀ violation in 1995, an extension was not granted by EPA. EPA reclassified the Phoenix nonattainment area on May 10, 1996, effective June 10, 1996.

As a result of the Phoenix area reclassification to serious, SIP revisions must be submitted to EPA by December 10, 1997. The SIP revisions must:

- # Provide for the implementation of best available control measures (BACM) no later than four years from the date of reclassification.
- # Contain a demonstration that the implementation of BACM will provide for attainment of the PM₁₀ NAAQS no later than December 31, 2001.

As with CO, if the State fails to submit an approvable plan, or plan element, under section 179 (b) of the CAA, the State could be subject to federal sanctions which include two-for-one offsets for industry and the loss of federal highway funds. According to ADOT, Arizona receives approximately \$257 million annually from the federal government for highway use.

SECTION II

THE SOURCES AND HEALTH AND ENVIRONMENTAL EFFECTS OF AIR POLLUTION

The purpose of Section II is to explain in more detail the three pollutants that were studied in depth by the Task Force (i.e., ozone, CO, and PM₁₀). Hazardous air pollutants (HAPs) were not specifically within the Task Force's mandate, but HAP emissions are reduced by many of the control measures recommended by the Task Force and where appropriate the fact has been noted in the analysis.

OZONE

Ozone is a summertime air pollution problem in Phoenix, and is typically a problem from May through September. Ozone is not emitted directly into the air, but is formed when gases called VOCs and nitrogen oxide (NO_x) react with oxygen in the air in the presence of strong sunlight, heat, and relatively light winds. When NO_x and VOCs are released and have time to Abake, ozone forms and builds to unhealthy levels.

Elevated levels of ozone can cause chest pain, coughing, nausea, throat irritation, and congestion. Ozone can damage the lungs, and worsen bronchitis, heart disease, emphysema, and asthma.

Elevated ozone levels have been correlated with increased numbers of hospital admissions and visits to emergency rooms for asthma and other respiratory problems, but otherwise healthy individuals are likely to suffer too. In one study of non-smoking adults living in the Los Angeles basin (an extreme nonattainment area for ozone), the subjects had experienced as much impairment in breathing capacity as that suffered by pack-a-day smokers. When normal, healthy people exercising at a moderate level are exposed to ozone, they experience significantly reduced lung function and inflammation (often with such symptoms as chest pain, congestion, and coughing).

In addition, ground-level ozone may interfere with the production and storage of starches in plants, reducing their growth rates. It also reduces the quality and yield of crops. A 1995 study forecasted that production of lettuce and other leafy vegetables in central Arizona would drop 28 percent during the next several years unless ozone levels are reduced. Ozone reduces the ability of trees and plants to fight disease, and has been shown to damage various tree seedlings.

Researchers also have estimated that nationally, ozone damages automobile tires at a cost of \$14 million per year. Ozone reacts with rubber, damaging it and reducing the life of tires by up to 25 percent.

Stratospheric, high-altitude ozone forms a protective layer (the Aozone layer) 10 to 35 miles above the earth to shield us from the sun's harmful ultraviolet (UV) rays. This same substance can be harmful to people and other living things when it is produced at ground-level, where we may be exposed to high levels of it.

VOC emissions in the Valley stem from a wide range of industrial and consumer sources and products. VOCs are found in gasoline, household cleaners, grease solvers and polishes, workshop and garden chemicals,

lighter fluid, and paint. Petroleum distillates, highly aromatic solvents, terpene, aliphatic hydrocarbons, glycols, and benzene are all VOCs and all contribute to the formation of ozone pollution in the summer in Phoenix. Highly reactive VOCs are also produced by certain types of vegetation. Approximately one-third of the VOC emissions in the Valley comes from vehicles. Figure 1 is a pie chart depicting the sources of VOC emissions in the Maricopa County Nonattainment Area in 1996.

NO_x emissions in the Phoenix metropolitan area come primarily from the exhaust of combustion sources such as large industrial boilers, generators, gas-powered mowers and blowers, and of course, motor vehicles. In fact about half of the NO_x emissions generated in the Phoenix metropolitan area come from cars and trucks—vehicle traffic. Figure 2 is a pie chart depicting the sources of NO_x emissions for the Maricopa County Nonattainment Area in 1996.

CARBON MONOXIDE

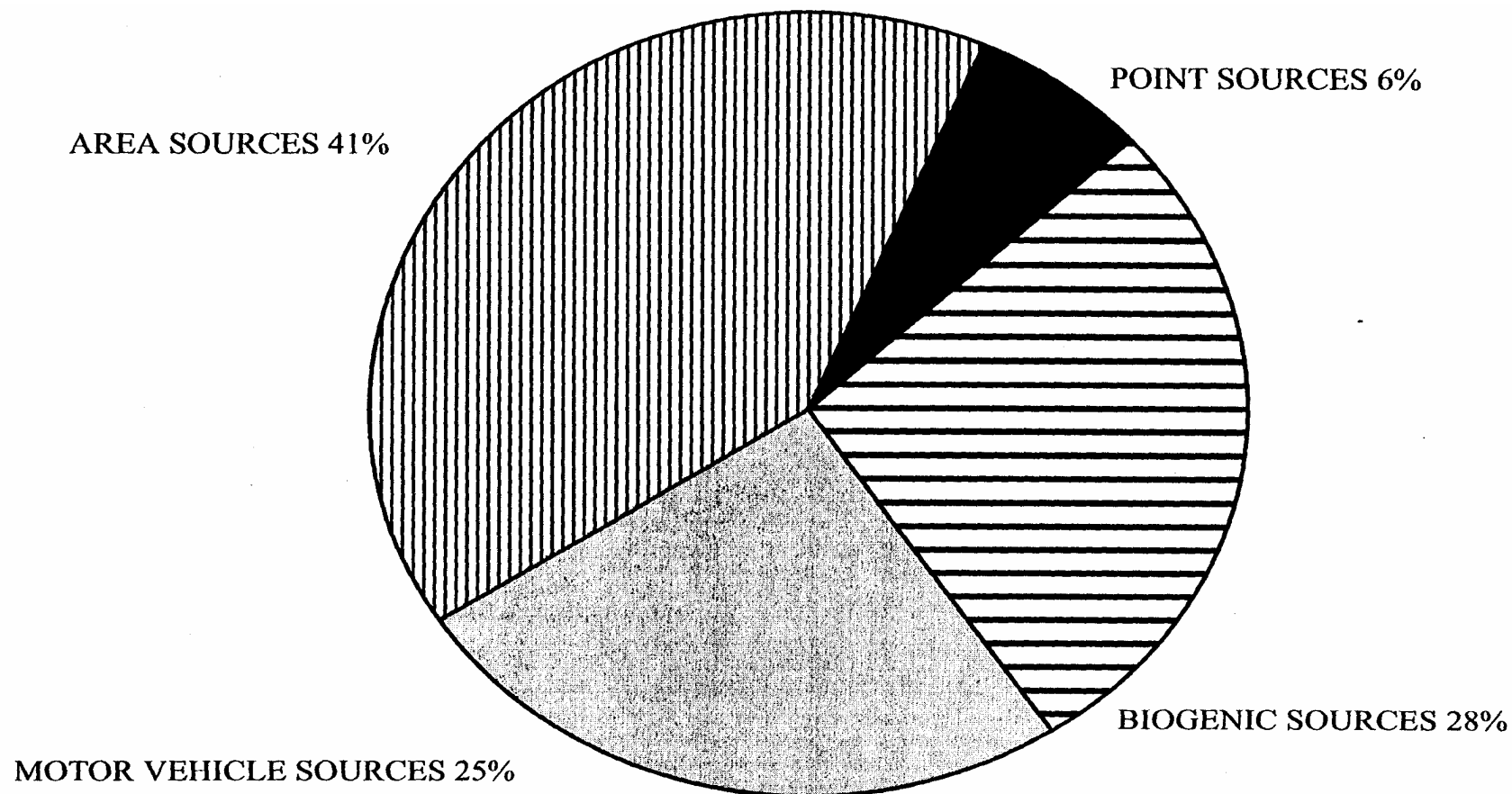
CO is emitted primarily from the burning of fossil fuels. The sources of CO include motor vehicle exhaust (81.5 percent); aircraft, locomotives, construction equipment, and lawn and garden equipment (17.2 percent); and area and point sources such as fireplaces, wood stoves, open burning, industry, manufacturing, and electrical power generation (1.3 percent). Figure 3 is a pie chart depicting the sources of CO emissions for the Maricopa County Nonattainment Area in 1995. At the time this report was published, 1996 data were not available; however, the new data are not expected to be substantially different. The federal standard for CO is an eight-hour average of 9.0 parts per million (ppm). Allowing for rounding of fractional readings, an eight-hour average of 9.5 ppm or greater is considered to represent an exceedance of the CO standard. In traffic-congested cities such as the Phoenix metropolitan area, CO concentrations may exceed 13.2 ppm as a one-hour average, and higher levels often occur along major traffic corridors.

Inhaled, CO does no appreciable harm to the lungs; the impact is on oxygenation of the entire body. CO combines chemically with hemoglobin, the oxygen-transporting element of the blood, to form carboxy-hemoglobin, which cannot carry oxygen to the brain, heart, and other vital organs. In fact, carboxy-hemoglobin binds to hemoglobin with 220 times the tenacity of oxygen itself.

For the otherwise healthy, exposure to high levels of ambient CO may mean flagging mental and physical energy, with diminished capacity to perform, as various organs and tissues are denied an adequate supply of oxygen. But for a number of specific population groups, including but not limited to those with certain chronic illnesses, even such nonlethal exposure to CO can have critical impact on their ability to perform daily tasks.

Pregnancy poses special hazards. Deprivation of oxygen, by any means, can cause harm to the developing fetus and also has been linked to low birth weight and prematurity. Exposure of a pregnant woman to CO creates an oxygen deprivation situation. It is therefore sensible to be concerned about the possibility of high CO levels having adverse prenatal impact.

Oxygen deprivation can be perilous to the elderly as well. Many elderly people suffer from such chronic ills as heart disease. CO exposure and accompanying oxygen deprivation compound these difficulties.



Data for August 10, 1996 Sensitivity Test

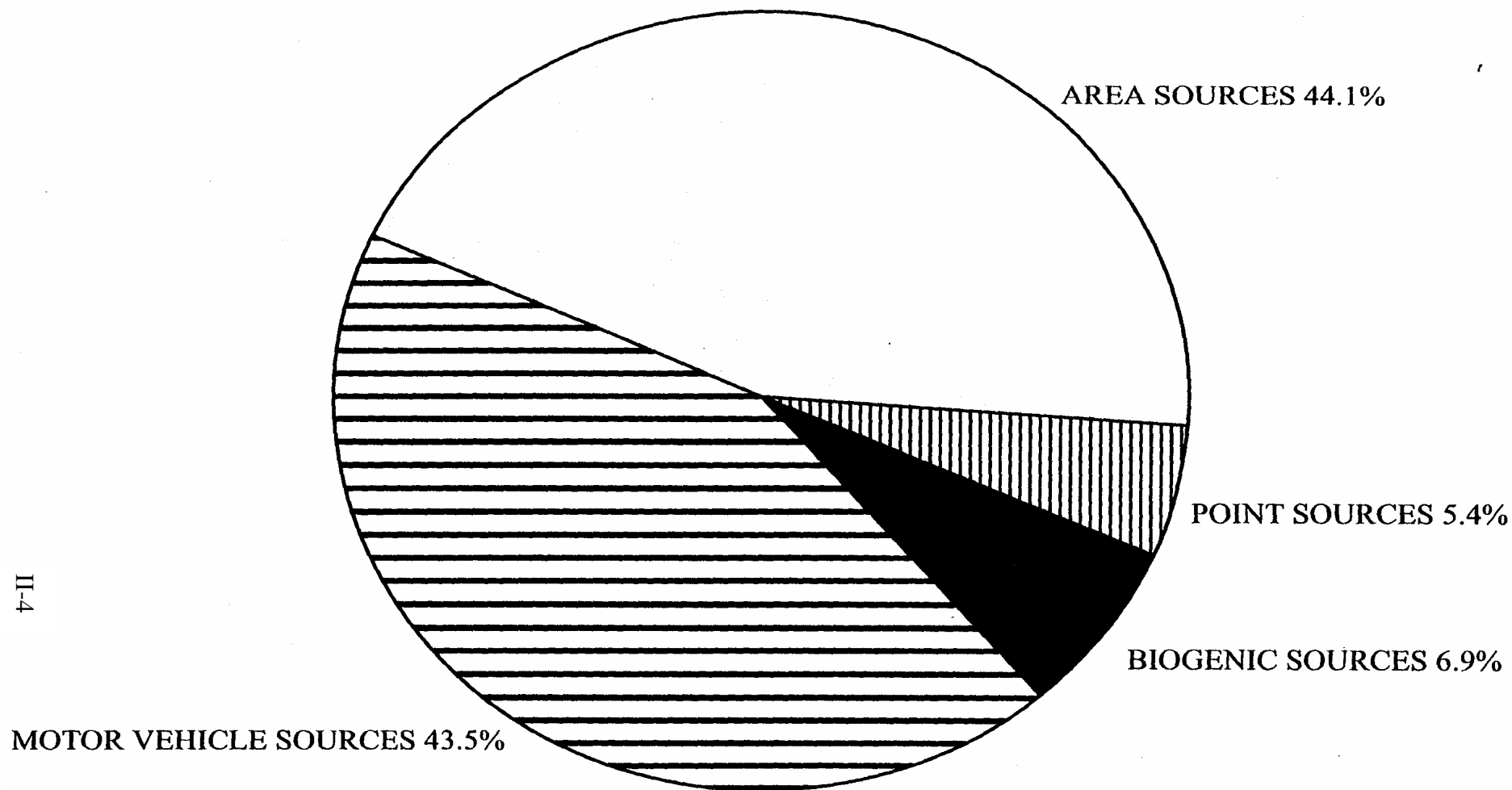
Notes: 1. All percentages may not add up to 100 because of rounding

2. This graph represents emissions over a full 24-hour period. Urban airshed modeling takes the time of day and relative ozone reactivity of these emissions into account, which may change the relative contribution to ozone formation for each source category.

Source: Arizona Department of Environmental Quality

MARICOPA COUNTY NONATTAINMENT AREA 1996 VOC EMISSIONS

Figure 1



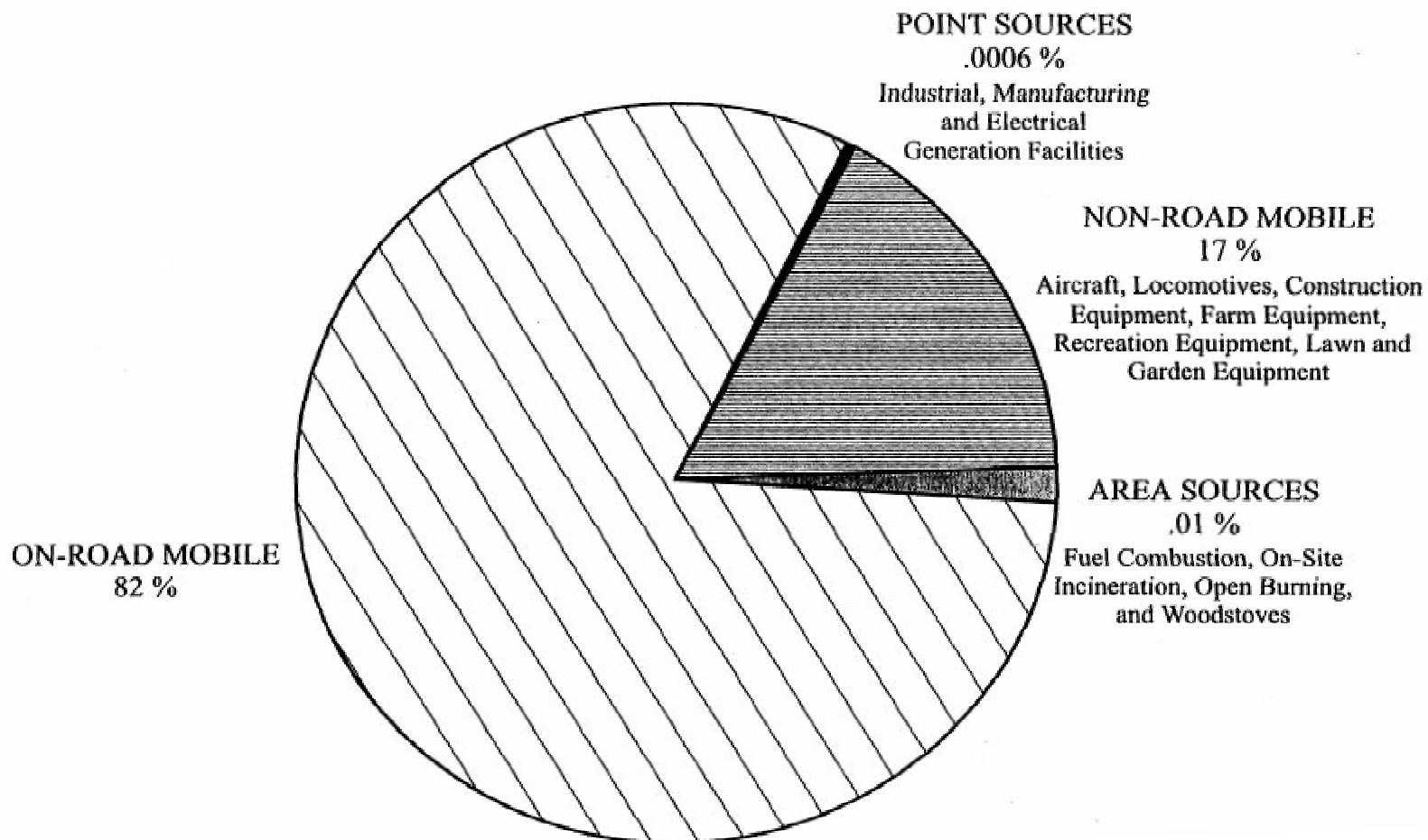
Data for August 10, 1996 Sensitivity Test

Note: 1. All percentages may not add up to 100 because of rounding

Source: Arizona Department of Environmental Quality

MARICOPA COUNTY NONATTAINMENT AREA 1996 NO_x EMISSIONS

Figure 2



Note: 1. All percentages may not add up to 100 because of rounding

Source: Arizona Department of Environmental Quality

MARICOPA COUNTY NONATTAINMENT AREA 1995 CARBON MONOXIDE EMISSIONS

Figure 3

PM₁₀

Particulate matter emissions are generated from numerous human activities including the following:

- # Travel on paved, unpaved, and industrial road surfaces
- # Construction site preparation and other earth-moving activities
- # Agricultural tilling
- # Residential wood and other combustion activities
- # Non-road and on-road vehicle exhaust using both diesel fuel and gasoline

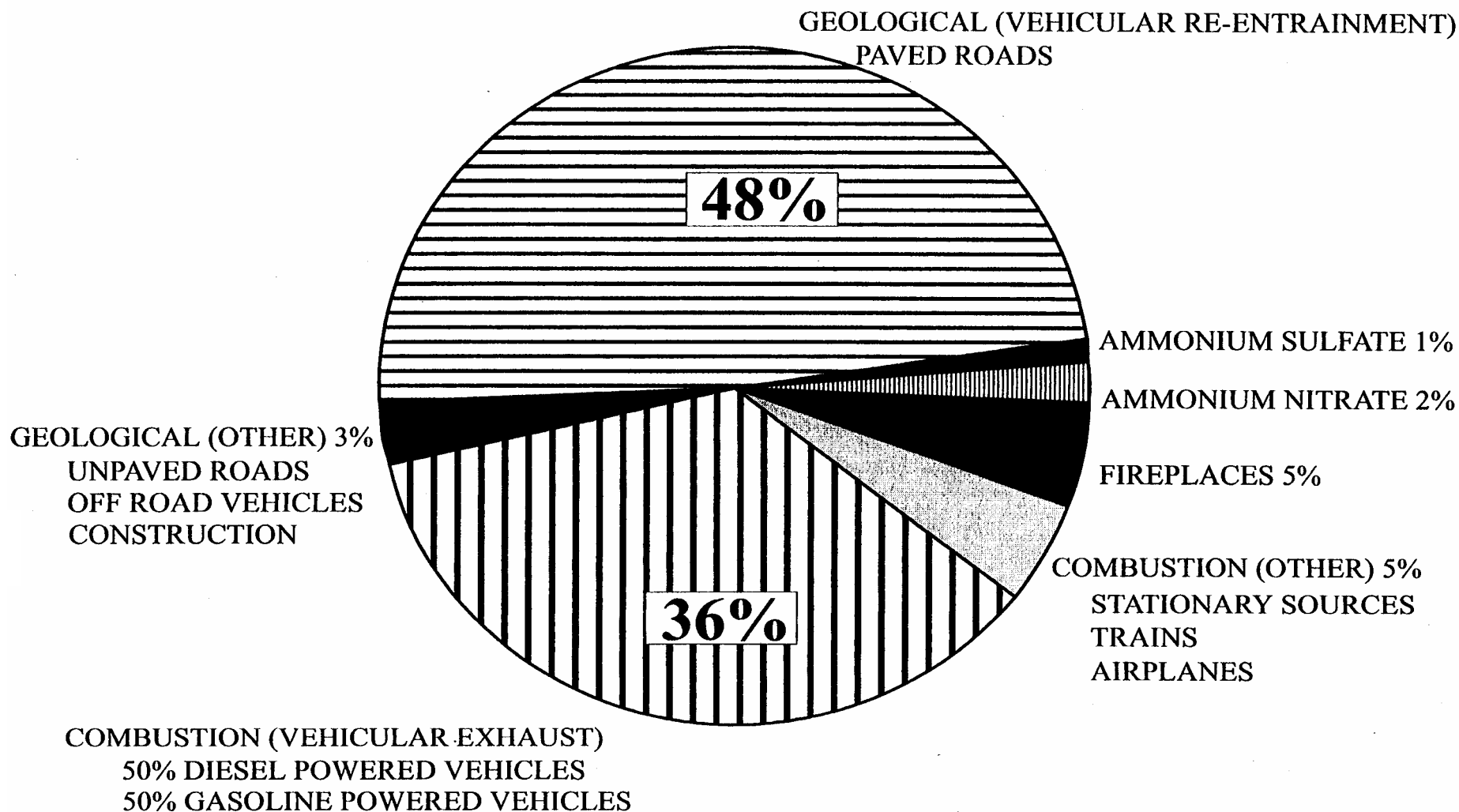
Windblown particulate matter emissions can also be significant over open disturbed areas. Figures 4 and 5 are pie charts showing the distribution of PM₁₀ sources in urban and rural Maricopa County, respectively. These pie charts were prepared for the 1992 Brown Cloud Study mentioned in Part I. New source data are being prepared for the new Microscale Field Study, and the new data will be much more site specific than the data presented here. The more regional data presented on the pie charts will not be invalidated, rather they will be supplemented by the Microscale Field Study.

To measure particulate matter levels to which the public is exposed, a network of monitors is situated throughout Maricopa County. Particulate matter concentrations are measured on a 24-hour and annual basis. The 24-hour health standard is based on a daily average of 150 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$). The annual health standard is based on an annual average of $50\mu\text{g}/\text{m}^3$. If a monitor records particulate levels exceeding the health standard, a violation is recorded².

PM can be in two forms—primary or secondary. Primary particles are those directly emitted to the atmosphere in particulate form, while secondary PM is formed in the atmosphere. Secondary particles typically form from condensation of vapors and as a result of chemical reactions involving gases like sulfur dioxide. This secondary PM can either form new particles or add to existing particles.

According to the EPA document, *Air Quality Criteria for Particulate Matter* (May 1996), "Many epidemiologic studies have shown statistically significant associations of ambient PM levels with a variety of human health endpoints, including mortality, hospital admissions, respiratory symptoms and illness measured in community surveys, and changes in pulmonary mechanical function. Associations of both short-term (usually days) and long-term (usually years) PM exposure with most of these endpoints have been consistently observed. The general internal consistency of the epidemiologic data base enhances the confidence accorded the reported results and has contributed to increasing public health concern. However, there remains uncertainty regarding the shapes of PM exposure-response relationships; the magnitude and variability of risk estimates for PM; the ability to attribute observed health effects to specific PM constituents; the time intervals over which PM health effects (e.g. shortening of life) are manifested; the extent to which findings in one location can be generalized to other locations; and the nature and magnitude of the overall public health risk imposed by ambient PM exposure. While the epidemiology data provide support for the associations mentioned above, understanding of underlying biologic mechanisms has not yet emerged."

² Most PM₁₀ monitors are operated every sixth day. Therefore, statistically one exceedence of the 24-hour PM₁₀ standard represents six theoretical exceedences when only one per year is measured.

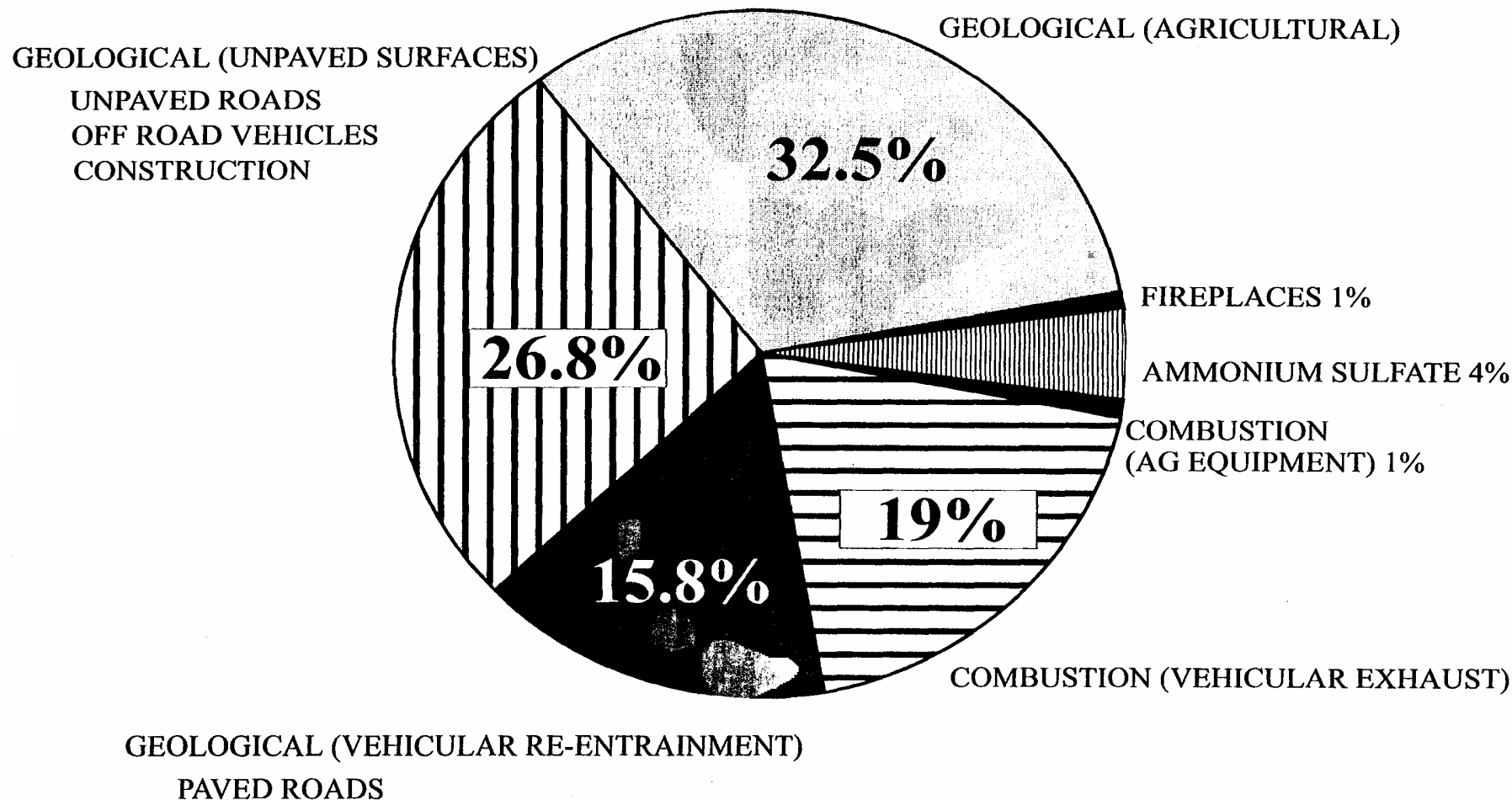


Note: 1. All percentages may not add up to 100 because of rounding

Source: Arizona Department of Environmental Quality

MARICOPA COUNTY NONATTAINMENT AREA URBAN PM₁₀ SOURCE DISTRIBUTION

Figure 4



Note: 1. All percentages may not add up to 100 because of rounding

Source: Arizona Department of Environmental Quality

MARICOPA COUNTY NONATTAINMENT AREA RURAL PM₁₀ SOURCE DISTRIBUTION

Figure

Additionally, EPA summarized the health effects of PM exposure that included the following key points excerpted from *Air Quality Criteria for Particulate Matter* (May 1996):

- # Epidemiologic studies show consistent positive associations of exposure to ambient PM with health effects, including mortality and morbidity. The observed associations of ambient PM exposure with health effects must be adjusted for the effects of other environmental or demographic factors, depending on whether the effects are acute or chronic, in order to quantitatively assess the role that may be attributed to PM exposure. Estimates of PM health effects have shown reasonable quantitative consistency in different studies, with only modest sensitivity to different methods of analysis. However, a clear understanding of specific biologic mechanisms remains to be established.
- # Individuals with cardiovascular or pulmonary disease, especially if they are elderly, are more likely to suffer severe health effects (mortality or hospitalization) related to PM exposure than are healthy young adults. Children and asthmatics are also susceptible to certain PM effects, e.g., increased respiratory symptoms and decreased lung function. Smokers also constitute a population group at increased risk for ambient PM exposure effects.
- # Development of a comprehensive biologically based exposure-dose-response model to aid health risk assessment requires further data characterizing differences in inhalability, airway geometry, and clearance rates among species. Information is also required on mechanism(s) of action, pathological processes affecting deposition and clearance of particles, and factors which influence the response(s) of respiratory tract tissues to particle burden.
- # Epidemiological studies indicate increased health risks associated with exposure to PM, alone or in combination with other air pollutants. PM-related increases in individual health risks are small, but likely significant from an overall public health perspective because of the large numbers of individuals in susceptible risk groups that are exposed to ambient PM. PM₁₀ and indicators of fine particles are more consistently associated with health risks than indicators of coarse particles.

HAZARDOUS AIR POLLUTANTS

HAPs are substances (gases or particles) in the air that pose a direct threat to human health through inhalation or other exposure routes. Excluded from this definition are those air pollutants for which NAAQS have been established: sulfur dioxide, nitrogen dioxide, ozone, CO, PM₁₀, and lead.

HAPs are emitted into the air from a wide variety of sources. The principal sources are combustion of fuels in engines and for heating, and uses of solvents and other chemicals. The emissions arise from motor vehicles, industries, businesses, and common household activities. An example of a less obvious source of HAPs is from evaporation of chlorinated swimming pool and domestic water. Also, dust from soils and rocks can contain naturally occurring, small amounts of some HAPs.

Exposures of people to HAPs depend on where they live, what HAPs are present in the air in that area, and how long they live there. HAPs can enter the body directly through breathing. Additionally, HAPs in particles settle out of the air and onto the soil.

Effects from HAPs on human health can be acute, meaning that a brief exposure of minutes or hours can cause an effect, such as respiratory dysfunction. They can also be chronic, in which case effects occur after many years or a lifetime of exposure, an example being contracting cancer.

SECTION III

RECOMMENDED CONTROL MEASURES

The recommended control measures fall into seven categories:

- # Upgrades to the IM 240 Program
- # Cleaner Burning Gasoline
- # Measures to More Effectively Control Emissions from Mobile Sources as well as Gasoline and Diesel Engines
- # More Effective Control of Point Source Pollution
- # More Effective Control of Area Source Pollution
- # Measures to Encourage the Use of Alternative Fuel Vehicles
- # Measures to Increase Public, Governmental, and Business Awareness of and Participation in Efforts to Reduce Urban Air Pollution

This section includes a description of each of these categories as well as each of the corresponding control measures. At the beginning of the description of each measure is a box that identifies the pollutants to which that measure applies.

Each measure contains a discussion of cost effectiveness. The estimated cost effectiveness of a measure depends on a number of factors, including the type of pollutant, source of pollutant, number of affected parties, etc. Accordingly, the Task Force does not intend, and the measures described in this section should not be read to imply, that the cost effectiveness of a particular measure can be applied generally to other sources.

UPGRADES TO THE IM 240 PROGRAM

Mandatory vehicle emissions inspection has been in place in the Maricopa Nonattainment Area since 1976. The program is considered a model for the nation due to continued improvements in effectiveness, while minimizing motorist inconvenience and cost. In 1995, Arizona began Enhanced Emissions Inspection for 1981 and newer model year vehicles registered or used to commute into the Maricopa Nonattainment Area. Enhanced Emissions Inspection includes the following components:

- # IM 240 is a transient, loaded-mode emissions test. Total vehicle emissions are measured during a simulated urban driving cycle, while the vehicle is operated at varying loads on a dynamometer, in a test procedure that is up to 240 seconds in length.
- # Evaporative emissions from vehicle fuels systems are also checked. Arizona uses a pressure test to check for leaks in the fuel system from the gas cap through the gas tank to the evaporative emissions canister, which traps gasoline vapors from the tank. A visual inspection looks for defects in the fuel system from the tank to the engine.

Arizona adopted Enhanced Emissions Inspection as part of its efforts to reduce CO and ozone pollution.

- # This form of a test is better able to accurately fail problem cars and pass clean cars, improving vehicle emissions. Idle and simple loaded tests, like those performed on 1980 and older vehicles, are adequate for those vehicle types, which are typically equipped with carburetors and lack computer controls. The simpler tests typically reveal problems related to air/fuel mixture, timing, and other readily identified defects. Today's cars, with sensors and computers, are much more complex, and need to be tested in a variety of driving modes, including acceleration and deceleration, in order to detect excessive emissions occurring in actual on-road use. Enhanced Emissions Inspection is a high tech test for today's high tech cars, and is a shorter version of the test used by manufacturers to demonstrate that new vehicles meet tailpipe standards.
- # Leaky fuel systems account for up to two thirds of total vehicle emissions of VOCs, which contribute to ozone pollution. Enhanced Emissions Inspection makes the testing of these systems possible.

Because Enhanced Emissions Inspection is highly accurate, the causes of emissions failure must be properly repaired in order for a failing vehicle to pass a subsequent test. With idle and simple loaded tests, it is possible to fix a car to pass the test, while not addressing the true cause of high emissions.

- # Thorough repairs of vehicle malfunctions identified by Enhanced Inspection allow the test to be run every other year (i.e., biennially), reducing hassles for motorists.
- # Enhanced Inspection is extremely cost effective. Nationally it is estimated that the cost of reducing both CO and VOC/hydrocarbon emissions through implementation of an Enhanced Inspection Program is \$1,600/ton.
- # Enhanced Inspection was found to be the single most effective measure to reduce CO and ozone pollution in the development of the 1993 Plans for those pollutants.

Based on these factors, the Task Force supports the five measures presented on the following pages to both maintain the program and further improve its effectiveness.

- # Making Vehicle Emissions Programs Self-Supporting
- # MVD Registration Enforcement and Mandatory Insurance Tracking
- # Tougher Emissions Test Pass/Fail Standards
- # IM 240 Testing of Constant Four-Wheel Drive Vehicles
- # Study Expansion of Area A Boundaries

MAKING VEHICLE EMISSIONS PROGRAMS SELF-SUPPORTING

THIS MEASURE APPLIES TO THE
FOLLOWING POLLUTANTS:
VOCs, NO_x, CO, PM₁₀, HAPs

Background and Description of Measure

The vehicle emissions programs lack adequate future funding in the following areas:

- # The current statute caps the annual emissions inspection fee at \$10 per year. While this cap currently covers the costs of emissions testing in Pima County and for pre-1980 model year vehicles in Maricopa County, it is not sufficient to support the full cost of the IM 240 Program for 1981 and newer vehicles in Maricopa County. The actual cost of an IM 240 test today is \$24.30, and is estimated at \$24.50 for calendar year 1997. Continued increases in inspection costs are anticipated for future years. This creates the need to cover the gap between the actual costs of testing and the limit on how much can be collected in fees for testing.
- # This statutory cap on annual emissions inspection fees also requires that almost all emissions tests required as a result of Remote Sensing must be paid for by the State rather than by vehicle owners in the affected areas.
- # The Vehicle Emission Program charges for the issuance of waivers, certificates of exemption, and certificates of inspection. However, the \$5 statutory cap on waiver fees falls far short of supporting the Waiver Program (with an estimated cost of \$27 per waiver or for vehicles which actually pass while requesting a waiver in Maricopa County). The actual cost of waiver actions in Pima County is \$17).
- # The Vehicle Emissions Program supports a number of activities for which there are no dedicated funding sources. These include the need to buy-down contractor costs for IM 240, remote sensing-generated emissions tests fees, customer assistance activities, the repair grant program for Food Stamp recipients, repair industry outreach and training, the Remote Sensing Program, and oversight of the emission inspection contract. These activities are currently supported by annual appropriations from the General Fund.

The Task Force believes that the owners of vehicles in areas affected by vehicle-caused pollution should bear the full costs of combating that pollution. The Task Force has two alternative recommendations to address this issue.

- # Option 1: Amend Arizona Revised Statute (ARS) ' 49-543 to raise the statutory cap on emissions inspection fees in Maricopa County to \$17.50 annually. This will allow test fees to cover the actual cost of testing for the immediately foreseeable future. The statute would also be amended to raise the

cap on the waiver fee from \$5 to \$10 in Maricopa County and to \$8 in Pima County.¹ The Task Force would propose to establish a new fee added to the vehicle license tax to support the currently unfunded programs described above as well as the other vehicle-related air pollution programs listed on the attached spreadsheet and described in this Report.² The new fee should not exceed \$5.00 annually in Maricopa County and should not exceed \$4 in Pima County.

- # Option 2: The Task Force would recommend retaining the current system of statutory caps and fund the difference between the test fee and cost of testing by a new vehicle registration fee estimated at less than \$10.00 annually for Maricopa County and less than \$1.50 in Pima County. This will complement anticipated efforts in the 1997 Regular Legislative Session to reduce the vehicle license tax by 25-30%.

Spreadsheets summarizing these two options are provided on pages III-7 through III-10.

Implementation Mechanism

Implementation of this measure entails enactment of amendments to ARS Section ' 49-543.

Period Required for Implementation

The Task Force recommends adoption of these changes to current State law for the 1997 session of State Legislature.

Barriers to Implementation

Some motorists and their representatives may resist additional fees. Establishing a new registration fee in the absence of offsetting reductions in the existing system of registration fees is likely to require a two-thirds vote in each house of the State Legislature.

¹ The Task Force recognizes that the recommended waiver fees fall far short of the actual cost of administering that program (e.g. \$27/waiver or waiver pass in Maricopa County and \$17 in Pima County). In making its recommendations, the Task Force has taken into account the fact that motorists receiving waivers are generally believed to have low incomes and raising the fee to entirely cover the cost of service may be a hardship

² As noted later in this report, the Task Force has recommended adoption of a number of new measures in the Maricopa Nonattainment Area to upgrade Vehicle Emissions Programs, more effectively control emission from mobile sources, and increase awareness of and participation in efforts to reduce urban air pollution. These measures are as follows: MVD Registration Enforcement and Mandatory Insurance Tracking, Tougher Pass-Fail Standards, Upgraded Smoking Vehicle Program, Vehicle Retrofit Program, Voluntary Vehicle Retirement Program, Lawnmower Replacement Program, Expanded Clean Air Campaign, Improvements in Ozone and Carbon Monoxide Forecasting, and Remote Sensing Public Information. Of the additional registration fee, about \$4.01 will be used to fund these programs.

Effectiveness of Measure

This measure is designed to make all programs to control vehicle emissions in the Maricopa and Pima Motor Vehicle Emissions Control Areas self-sufficient, thus ensuring uninterrupted operation of these programs.

Vehicles contribute over 80% of CO emissions, 25% of ozone forming volatile organic chemical emissions, and 85% of PM (annual average) emissions in the Maricopa Nonattainment Area. As noted at the outset of this section, the Enhanced Inspection Program is one of the most cost-effective means of reducing these emissions.

Accuracy of Effectiveness Determination

Not applicable.

Cost of Measure

See pages III-7 through III-10.

Affected Parties

- # Motorists in Maricopa and Pima counties
- # Arizona Legislature
- # ADEQ
- # Motor Vehicle Department (MVD)
- # Emissions inspection and remote sensing contractors

SUMMARY OF I/M FULL FUNDING PROPOSAL

	Costs of Testing	Other Costs for Existing Program	New Program Costs	Total Costs
Pima County	\$2,971,792	\$467,517	\$0	\$3,439,309
Maricopa County				
I/M 240	\$4,553,890	\$2,958,157		\$7,512,047
Non-I/M 240	\$96,000			\$96,000
Tougher Pass/Fail Standards			\$120,000	\$120,000
Constant 4-Wheel Drive I/M 240	\$169,939			\$169,939
Passenger Vehicle Retrofit			\$200,000	\$200,000
Remote Sensing Public Information			\$30,000	\$30,000
Mandatory Insurance Tracking			\$320,000	\$320,000
Enhanced Smoking Vehicle Program			\$132,900	\$132,900
Improved O3 & CO Forecasting			\$350,500	\$350,500
Expanded Clean Air Campaign			\$1,700,000	\$1,700,000
Lawnmower Replacement			\$500,000	\$500,000
Voluntary Vehicle Retirement			\$4,000,000	\$4,000,000
TOTAL	\$7,791,621	\$3,425,674	\$7,353,400	\$18,570,695

ALTERNATIVE FUNDING PROPOSALS

	Annual Test Fee		New Registration Fee Not to Exceed
	1997	Not to Exceed	
Option 1 (allow inflation adj. for all fees)	\$12.44	\$17.50	\$5.00
Option 2 (inflation adj. registration fee only)	\$10.00	\$10.00	\$10.00

Maricopa County VEI Program Self-Sufficiency Proposal

Cost/Revenue Center	Estimated FY 97 Costs			Status Quo		Full Funding	
	# of units	Cost Per unit	Total	Revenue per unit	Total	Revenue per unit	Total
Customer Service			224,243		0		0
Code 52	403	\$11.13	4,485		0		0
Alt. Fuel Cert.	700	\$6.41	4,485		0		0
Referee requests	3,969	\$8.47	33,636		0		0
Remainder 2722*			181,637		0		0
Waiver			807,848	151,530		303,060	
Waiver requests**	52,701	\$15.33	807,848		0		0
Waiver pass/grant**	30,306	\$26.66		\$5.00	151,530	\$10.00	303,060
Out of State Exemptions			16,702	8,700		14,500	
Out of State Exempt **	2,900	\$5.76	16,702	\$3.00	8,700	\$5.00	14,500
Repair Grant			100,000		0		0
Repair Grants Processing	500	\$0.00	0		0		0
Repair Grants	500	\$200.00	100,000		0		0
Repair Industry Outreach			93,590				0
Repair Techninians	1,000	\$93.59	93,590		0		0
Fleet			329,000	637,260		637,260	
Cert's of Inspection	127,452			\$5.00	637,260	\$5.00	637,260
Lic. Inspectors	775				0		0
Active Fleet Permits	234				0		0
Fleet Analyzer Cert.	388				0		0
Non-Fleet			100,282		0		0
Non-Fleet Analyzer Cert.	37				0		0
Non-Fleet Dealers	813				0		0
Citizen Complaints/Respns.	23				0		0
Non-Fleet Technician							
Training/Certification	52				0		0
Non-Fleet Gov't Entity	116				0		0
Remote Sensing			1,568,088		0	653,088	
Remote Sensing	1,876,727	\$0.49	915,000		0		0
Triggered Tests (I/M 240)	22,400	\$24.87	557,088			\$24.87	557,088
Triggered Tests (NON I/M 240)	9,600	\$10.00	96,000		0	\$10.00	96,000
Gordon Darby Oversight			371,492		0		0
Gordon Darby oversight			371,492				
SUBTOTAL			3,611,245	797,490		1,607,908	
I/M 240**Buy Down(1st half FY'97)	389,400	\$4.50	1,752,300				
I/M 240**Buy Down(1st half FY 97)	428,340	\$5.24	2,244,502				
Non-I/M 240 Tests	276,247	\$0.00	0				
I/M 240 Increase 1st half FY97				0		\$4.50	1,752,300
I/M 240 Increase 2nd half FY97				0		\$5.24	2,244,502
SUBTOTAL			7,608,047	797,490		5,604,710	
ADD: GENERAL FUND APPROP.				4,300,000		0	
NEW REGISTRATION FEE				0		\$1.07	2,003,337
SHORTFALL (use VEI Fund balance)				2,510,557			
TOTAL			7,608,047	7,608,047		7,608,047	

* Includes providing program information and general technical assistance.

** Statutory cap on fees.

Note: Annual inflationary increases to fees are required to cover contractual obligations to Gordon Darby.

Note: 1st half FY 97 I/M 240 test fee is \$24.50. 2nd half FY 97 I/M 240 test fee is \$25.24.

Non-I/M 240 test is \$10.00.

Options 6A & 6B reduce costs of running the program by \$613,620 because 126,000

IMPACT OF ADDITIONAL 'AREA A' PROGRAMS ON IM FULL FUNDING PROPOSAL

	ADDITIONAL FUNDS NEEDED	NEW REGISTRATION FEE	IM 240 INSPECTION FEE INCREASE	NON-IM 240 INSPECTION FEE INCREASE
Fee Necessary to Support Current IM Program	N/A	\$1.07	\$25.24	\$10.00
Sample Calculation*	\$100,000	\$0.05	\$0.07	\$0.02
Tougher Pass/Fail Standards	\$120,000	\$0.06		
Constant 4-Wheel Drive IM 240	\$169,939	\$0.09	\$0.15	\$0.15
Passenger Vehicle Retrofit	\$200,000	\$0.11		
Remote Sensing Public Information	\$30,000	\$0.02		
Mandatory Insurance Tracking	\$320,000	\$0.17		
Enhanced Smoking Vehicle Program	\$132,900	\$0.07		
Improved O3 & CO Forecasting	\$350,500	\$0.19		
Expanded Clean Air Campaign	\$1,700,000	\$0.91		
Lawnmower Replacement	\$500,000	\$0.27		
Voluntary Vehicle Retirement	\$4,000,000	\$2.13		
TOTAL, ALL PROGRAMS	\$7,523,339	\$4.01		

*Provided to gauge the impact of each additional \$100,000 of new program expenses.

Pima County VEI Full Funding Proposal

<u>Cost/Revenue Center</u>	<u>Estimated FY 97 Costs</u>			<u>Status Quo</u>		<u>Full Funding</u>	
	<u># of units</u>	<u>Cost Per unit</u>	<u>Total</u>	<u>Revenue per unit</u>	<u>Total</u>	<u>Revenue per unit</u>	<u>Total</u>
2722 TOTAL			48,693		0		0
Code 52	2,584	\$0.38	974		0		0
Alt. Fuel Cert.	300	\$3.25	974		0		0
Referee requests	1,375	\$5.31	7,304		0		0
Remainder 2722*			39,441		0		0
2731 TOTAL			202,152		59,390		95,024
Waiver requests**	20,363	\$9.93	202,152		0		0
Waiver pass/grant**	11,878	\$17.02		\$5.00	59,390	\$8.00	95,024
2733 TOTAL			10,255		3,750		6,250
Out of State Exempt.**	1,250	\$8.20	10,255	\$3.00	3,750	\$5.00	6,250
2734 TOTAL			0		0		0
Repair Grants Processing	0	\$0.00	0		0		0
Repair Grants	0	\$0.00	0		0		0
2737 TOTAL			0		0		0
Repair Training	0	\$0.00	0		0	\$0.00	0
2740 TOTAL			122,757		152,360		152,360
Cert's of Inspection	30,472			\$5.00	152,360	\$5.00	152,360
Lic. Inspectors	229				0		0
Active Fleet Permits	77				0		0
Fleet Analyzer Cert.	135				0		0
2750 TOTAL			41,430		0		0
Non-Fleet Analyzer Cert.	35				0		0
Non-Fleet Dealers	241				0		0
Citizen Complaints/Respns.	8				0		0
Non-Fleet Technician							
Training/Certification	51				0		0
Non-Fleet Gov't Entity	30				0		0
2755 TOTAL			0		0		0
Remote Sensing (FY96#)	0	\$0.00	0		0		0
Triggered Tests	0	\$0.00	0		0		0
2721 TOTAL			42,230		0		0
Gordon Darby oversight			42,230				
SUBTOTAL			467,517		215,500		253,634
Non-I/M 240 Tests	446,886	\$6.65	2,971,792	\$6.65	2,971,792	\$6.65	2,971,792
SUBTOTAL			3,439,309		3,187,292		3,225,426
ADD: I/M 240 BUY DOWN					0		0
GENERAL FUND APPROP.							0
NEW REGISTRATION FEE ***						\$0.39	213,883
SHORTFALL (use VEI Fund balance)					252,017		
TOTAL			3,439,309		3,439,309		3,439,309

* Includes providing program information and general technical assistance.

** Statutory cap on fees.

*** Annual fees; The test fee will be collected by the contractor, or the administrative fee would n

Note: Test fee is an average of CY '96 fee of \$6.55 and an estimate of \$6.75 for CY '97.

MVD REGISTRATION ENFORCEMENT AND MANDATORY INSURANCE TRACKING

THIS MEASURE APPLIES TO THE
FOLLOWING POLLUTANTS:
VOCs, NO_x, CO, HAPs

Background and Description of Measure

MVD Registration Enforcement and Mandatory Insurance Tracking

Ensuring that vehicles operating in the Maricopa County Nonattainment Area for ozone and CO are properly registered is important to assure that they comply with vehicle emissions inspection requirements. Failure to register and meet emissions standards creates needless air pollution and deprives the State of Vehicle License Tax revenue. MVD of ADOT estimates that at least 10.4% of VMT in the Maricopa Area are associated with vehicles not covered by the Vehicle Emissions Inspection. There are four categories of vehicles that are not registered properly.

- # Vehicles that are registered in an attainment area, but should be registered in a nonattainment area because either the owner and vehicle reside in nonattainment area or the owner commutes on a regular basis from an attainment area to a nonattainment area.
- # Vehicles that have expired registrations.
- # Vehicles that are not properly registered in Arizona or another state.
- # Vehicles that are registered in another state, but should be registered in Arizona.

MVD has instituted a comprehensive program to enforce the registration laws and expects that the initial registration compliance rate will go up dramatically as that program is fully implemented. MVD started its new registration enforcement initiative approximately a year ago and it has already produced dramatic results.

The Task Force recognizes the importance of improving motorist compliance with registration and vehicle emissions inspection requirements. For this reason the Task Force endorses continued implementation of existing and planned enhancements to enforcement efforts, a new initiative using insurance data to identify improperly registered vehicles, and a study by ADEQ and MVD on potential new enforcement methods. The first part of this measure is to endorse the three-part enhanced vehicle registration enforcement program described below.

1. Registration Enforcement Team

The Registration Enforcement Team is a group of MVD employees whose job it is to enforce Arizona's registration laws. The Team takes leads and pursues them to make sure that the vehicles in question are registered properly. Leads are generated in the following ways.

- # Citizens will call, mail in, or walk in a complaint that they viewed a vehicle that may be in violation of Arizona's registration laws. Based on the information obtained, a letter is sent out to the violator.
- # MVD will send out enforcement personnel to a location to look for any of the four types of registration violations.
- # MVD issues public service announcements to inform the public that these enforcement efforts are taking place.

2. Registration Enforcement Tracking System

This is a tracking system that will allow the Registration Enforcement Team to monitor the potential violations more closely and improve follow up activities. It will contain complete policy and procedures for Registration Enforcement activities, to ensure consistency and equity. The system will automatically generate letters, contain a tickler file to ensure that cases are actively pursued, and provide complete and accurate reports to measure effectiveness.

3. New Resident Tracking

MVD will purchase the names of new residents and then track those customers to see if they have registered their vehicles properly. One source of names is the US WEST database of customers who have disconnected their service in another state and connect new service in Arizona. If the new customer has an Arizona Driver's License but has not registered their vehicle after a month, a "friendly reminder" letter will be sent to inform the customer of Arizona's registration laws. If the customer has not registered their vehicle after five months, the "lead" will be turned over to the Registration Enforcement Team.

MVD Registration Enforcement

Implementation Mechanism

The Registration Enforcement Program has already been implemented and its initial cost is in the ADOT budget. The design of the Registration Enforcement Tracking System has been completed and construction of application has started. Design of the New Resident Tracking component has been completed, the construction of the application has started, and a contract is in the procurement process.

Period Required for Implementation

The Registration Enforcement Team currently exists. Both the Registration Enforcement Tracking System and the New Resident Tracking will be completed by January 1997.

Barriers to Implementation

None.

Effectiveness of Measure

It is estimated that 41,000 additional vehicles in Maricopa County will be emission tested as a result of implementing these components of this measure. Associated emission reductions are estimated at 6.51 tons/day of CO, 0.43 tons/day of VOCs, and 0.20 tons/day of NO_x in the Maricopa Nonattainment Area. Additionally, implementation of this measure is anticipated to bring in revenue from the additional registration fees as follows:

1. Registration Enforcement Team \$12,000,000.00 (annual benefit)

70,000 additional vehicle registrations at an average of \$170 = \$12,000,000.00. Actual data from 1995 - 1996 registration statistics.

2. Registration Enforcement Tracking System

Benefits from this measure already counted in other measures. This program is a tool to make the registration enforcement effort more efficient and effective.

3. New Resident Tracking \$1,224,000.00 (annual benefit)

MVD will receive 3000 names a month or 36,000 a year. Projections are that this will translate to 20% increase in registration compliance for the 36,000 customers or 7,200 additional registrations. The average registration is approximately \$150.00. 7,200 customers³ at \$170.00 per customer = \$1,224,000.

Accuracy of Effectiveness Determination

The estimated increase in vehicle registration within the nonattainment area along with the estimated additional revenue has been provided by MVD. The estimated reduction in air pollutant emissions was calculated by ADEQ utilizing MOBILE5 emissions factors.

Cost of Measure

1. Registration Enforcement Team \$270,000.00 (annual cost)
2. Registration Enforcement Tracking System \$23,450.00
3. New Resident Tracking \$13,450.00

Affected Parties

³ 80% of Arizona vehicles are registered in nonattainment areas.

- # New residents
- # Noncomplying residents

Mandatory Insurance Tracking

The second part of this measure is to support a new initiative to utilize insurance information to better enforce registration and emissions inspection requirements. Arizona currently receives insurance information on Arizona residents under existing mandatory insurance requirements. Currently, insurance policies that do not match up with a registered vehicle are dropped after 60 days. Under this initiative, MVD will track the names of people who have insurance policies in Arizona, but whose vehicles are not registered in Arizona. These vehicles will become leads to the Registration Enforcement Team.

Implementation Mechanism

MVD would implement the measure by integrating this program into its current vehicle registration enforcement program.

Period Required for Implementation

MVD anticipates implementation of this program within eight months after funding is appropriated.

Barriers to Implementation

This measure would require additional funding for the startup of the program. Once the program is established it will be self-sufficient due to the collection of registration fees.

Effectiveness of Measure

It is estimated that 54,000 additional vehicles in Maricopa County will be emission tested as a result of implementing this measure. Emission reductions in CO, VOCs, and NO_x are anticipated from the additional vehicles that are emissions tested. The estimated reduction in air pollutants for the Maricopa County nonattainment area due to the implementation of this measure is 8.40 tons per day of CO, 0.55 ton per day of VOCs, and 0.26 tons per day of NO_x.

Additionally, implementation of this measure is anticipated to bring in revenue from the additional registration fees. Annually, MVD receives information on 1,000,000 insurance policies which do not match up with registered vehicles. Projections are that this will translate to a 10% increase in registration compliance for the 1,000,000 customers or 100,000 additional registrations State-wide. Sixty percent of Arizona vehicles are registered in the Maricopa County Nonattainment Area. The average registration is approximately \$170.00. Therefore, 60,000 customers at \$170.00 per customer = \$10,200,000.

Accuracy of Effectiveness Determination

The estimated increase in vehicle registration within the nonattainment area along with the estimated additional revenue has been provided by MVD. The estimated reduction in air pollutant emissions was calculated by ADEQ utilizing MOBILE5 emissions factors.

Cost of Measure

The entire insurance tracking program will cost approximately \$320,000 for its initial startup. Due to the start-up cost of the program, the initial cost of the emission reductions anticipated from this control measure is \$38,100 per ton CO. However, once the program is established, the program will pay for itself through the vehicle registration fees that are generated, thus earning money for each ton of pollutant reduced. In other words, there will be no cost associated with the reduction in emissions in the future. The Task Force recommends that this measure be funded by the new vehicle registration fee described in the measure entitled **Making Vehicle Emissions Programs Self-Supporting.**

Affected Parties

- # New residents
- # Non-complying residents

MVD New Resident Tracking

The third part of this measure would endorse a joint study by ADEQ and MVD on the feasibility and potential benefits of requiring earlier emissions testing of vehicles brought into the Maricopa Area. As discussed earlier, under current State law, the requirement for a motor vehicle to undergo emissions inspection is tied to the requirement to register the vehicle here. The registration requirement is triggered by the vehicle owner becoming a resident of the State. The statutory definition of a resident prescribed in ARS Section 28-102 is structured so that a vehicle can be operated in Arizona for up to seven months prior to being required to be registered. This creates the opportunity for malfunctioning, high-emitting vehicles to operate in the Maricopa Nonattainment Area through an entire ozone or CO season.

The purpose of this measure is to advance the time when vehicles are required to be emissions tested by determining the effectiveness of new legislation to provide that the requirement for emissions inspection be triggered by the earlier of the following:

- # The owner of the vehicle becomes a resident, as defined under ARS Section 28-102.
- # The vehicle is available for operation in Area A for 60 or more days.

The legislation would have to include a sanction for failure to have the vehicle emission tested.

Implementation Mechanism

The successful implementation of this measure is dependent upon implementation of other components described earlier the Registration Tracking Program and the Mandatory Insurance Tracking Program. Also necessary to support this measure is implementation of electronic data sharing connectivity between the State's emissions testing contractor and MVD. Under this approach, MVD could notify motorists with new phone hook ups or insurance policies of the requirement to have emissions inspection within 60 days of bringing a vehicle into the State. MVD could authorize the emissions testing contractor to sell to motorists receiving these tests a \$0.25 Air Quality Compliance Sticker to be affixed near the rear license plate. The emissions testing contractor would electronically advise MVD of the identity of vehicles being tested under this program. At 120 days after the initial letter had been sent by MVD, and no record of an emissions test, that vehicle's plate could be flagged by MVD for enforcement by local law enforcement personnel. Vehicles that received a Compliance Sticker could be monitored by MVD, in order to enforce registration requirements, assuming the vehicle has remained in the State for seven months or more.

Period Required for Implementation

ADEQ and MVD would need to revise existing rules, requiring 6 to 12 months after enactment. The Registration Tracking Program will be implemented in January 1997. The Insurance Tracking Program will be implemented within eight months of funding. Assuming funding is made available at the start of Fiscal Year 1998, which begins July 1, 1997, the Insurance Tracking Component can be on line in March 1998. New emissions testing requirements could be made effective anytime after that date.

Barriers to Implementation

Several issues make implementation of this measure difficult. While improvements in MVD programs will assist in enforcement, it may still be difficult to identify vehicles and enforce the requirements. The measure may be perceived as discouraging tourism and winter visitors, which contribute significantly to the local economy. If winter visitors actually drive newer vehicles, the effectiveness of this measure may be lessened. Equity issues arise in the context of requiring emissions testing here for vehicles that may be required to be tested in their home state.

Effectiveness of Measure

ADEQ estimates that approximately 10.4% of vehicles operating in Area A are outside the Vehicle Emissions Inspection Program. This estimate includes pro rata vehicles, improper registrations, winter visitors, and through traffic. No data exist to further define the vehicles operating here for more than 60 days. The Task Force has a number of reservations concerning this proposal but given its significant potential, it is worthy of additional analysis.

Accuracy of Effectiveness Determination

Poor.

Cost of Measure

MVD estimates the cost developing an electronic link to pass emissions information from MVD to the emissions testing contractor, and vice versa, at approximately \$134,000.

Affected Parties

- # ADEQ
- # Emissions contractor
- # MVD
- # Visitors and persons relocating to the Phoenix metro area

TOUGHER EMISSIONS TEST PASS/FAIL STANDARDS

THIS MEASURE APPLIES TO THE
FOLLOWING POLLUTANTS:
VOCs, NO_x, CO, HAPs

Background and Description of Measure

Pursuant to Arizona Administrative Code (AAC), R18-2-1006, more stringent IM 240 pass/fail standards (final standards) are mandated to be effective on January 1, 1997. Adoption of final standards would increase the effectiveness of IM 240 by increasing the identification of vehicles with high emissions. Studies conducted in the Arizona emissions testing lanes during 1995 and 1996 demonstrated, however, that without adequate preconditioning 50% or more of the vehicles failing under final standards will be false failures. A false failure rate of such magnitude would quickly erode public and repair industry confidence in the program. Consequently, the Task Force agrees with ADEQ that implementation of final standards must be postponed until an adequate preconditioning routine can be determined and incorporated within the test protocol. Postponement of final standards pending resolution of the preconditioning issue is supported by emissions testing contractor, EPA, and automobile manufacturers. Postponement of implementation of the final standards will result in a shortfall in emissions reduction credits for the IM 240 Program.

Implementation Mechanism

Implementation of an alternative test protocol will require amendment of AAC R18-2-1006, and modification of the inspection service contract with the emissions inspection contractor. Before revisions can be made, additional research is needed to fully identify and validate an effective alternative transient loaded emissions test protocol that will substantially reduce false failure rates. Initial research conducted by Sierra Research (sponsored by American Automobile Manufacturers Association and EPA) indicates that an alternative test protocol (back-to-back IM 240 second phases) appears to be effective in resolving false failures caused by inadequate preconditioning, but confirmation of this determination required additional research.

Key to the quick implementation of new standards is the ability of ADEQ to rapidly revise its rules after acceptable test procedures and pass/fail standards are identified. This measure should include a request that the Legislature enact session law authorizing ADEQ to amend rules regarding the IM 240 test procedure and pass/fail standards through accelerated rulemaking.

Period Required for Implementation

Necessary research to validate an alternative test protocol will take from six months to one year. Revision and adoption of enabling rules will require a minimum of one year. If rules can be adopted through an accelerated rulemaking procedure, the adoption schedule can be accelerated to three to six months. Modification and beta testing of software could be completed by the contractor within 30 days in advance of rule adoption. Implementation would begin on the first work day of the month following the rule's effective date.

Barriers to Implementation

Time and expense associated with thoroughly researching an alternative test protocol are the primary barriers. Consolidation of preconditioning within the test protocol will result in a longer test and reduced throughput (number of tests performed/hour). During 1995, and again in 1996, IM 240 test demand exceeded the respective year's projected volume. IM 240 volumes experienced in 1995 and 1996 are at the year 2001 projections. The existing network of 10 stations and 48 lanes was designed to provide adequate capacity to meet demand (at projected levels), while keeping average waits to less than 15 minutes through the term of the contract (December 31, 2001). Continued area growth and a significantly improved new car market (the number of vehicles tested greatly exceeding projection) will result in test demand that greatly exceeds the design capacity well before the term of the existing contract.

Provisions passed in Senate Bill 1002 (Forty-second Legislature, Seventh Special Session, 1996), clean screen remote sensing (ARS ' 49-542.01.D.), and voluntary opt out for new motor vehicles (ARS ' 49-543.C.) will reduce demand for IM 240 testing. The number of vehicles to be excused from testing is yet to be determined, but annual demand is expected to be above the projected level in any given year as new vehicles subject to testing are expected to exceed the number excused by the SB 1002 measures and natural attrition.

Continued demand that exceeds optimal levels and a considerably longer test (reduced throughput), will greatly erode customer convenience and public acceptance of the program. Network expansion or additional reductions in demand (moving all gasoline vehicles to biennial testing under a more stringent and more effective test - IM 240 type) will be necessary to maintain acceptable service to motorists.

Effectiveness of Measure

Failure rate of the emissions portion of the IM 240 test under final standards is expected to increase between 20 to 25% from the 11 to 12% rate experienced in 1995 and 1996 to a failure rate of 13 to 15%. This increase in identification of excess emissions will reduce emissions of CO, hydrocarbons, and NO_x. However, the amount of the reduction cannot currently be determined. This measure will also allow full credit for the emissions portion of IM 240 in the SIP.

Accuracy of Effectiveness Determination

Cost estimates are based on procurement of similar consulting research contracted by the Department. The estimate for software revision was provided by the emissions inspection contractor. The cost of test station network expansion is unknown.

Estimates of increased failure rates are based on studies conducted in Arizona during 1995 and 1996 where final IM 240 pass/fail standards were employed. More precise estimation of anticipated failure rates would be possible during validation research as would an accurate determination of expected emissions reductions.

Cost of Measure

The cost for implementation of this measure would be for research to determine an effective alternative test protocol, software modification and beta testing, and necessary test network expansion. The cost of additional research is estimated at \$100,000. The cost for software modification and beta testing is estimated at \$20,000. The cost of network expansion cannot be estimated until future demand can be reasonably projected (impacts of SB 1002 measures quantified) and not until an effective alternative test protocol is available and the resulting average test time can be calculated. In 1992, EPA estimated a cost effectiveness of \$1,600 per ton of pollutant reduced for the implementation of a high-tech IM program. The cost effectiveness for the Maricopa County IM 240 program is likely to be somewhat higher than the EPA estimate; however, the cost effectiveness rate for IM 240 compares very favorably to that of other measures. The Task Force recommends that this measure be funded by the new vehicle registration fee described in the measure entitled **AMaking Vehicle Emission Programs Self-Supporting.**@

Affected Parties

Approximately 1.4 million motorists in the Maricopa Motor Vehicle Emissions Control Area whose vehicles are subject to the IM 240 test biennially.

IM 240 TESTING OF CONSTANT FOUR-WHEEL DRIVE VEHICLES

THIS MEASURE APPLIES TO THE FOLLOWING POLLUTANTS: VOCs, NO _x , CO, PM ₁₀ , HAPs

Background and Description of Measure

This measure will require that full-time four-wheel drive vehicles and vehicles equipped with traction control receive the transient loaded emissions test (i.e., IM 240). Implementation of this measure will require the installation of dual-axle dynamometers in several locations throughout the inspection station network in metropolitan Phoenix. National estimates comparing the effectiveness of idle and IM 240 tests show that IM 240 is about three times as effective in reducing vehicle emissions as the idle test.

Implementation Mechanism

ADEQ and the emissions testing contractor would amend the existing contract to require installation of these dynamometers and administration of this test to the classes of vehicles described above. The emissions testing contractor would be responsible for the installation of dual-axle dynamometers in selected sites. Several more heavily utilized facilities would be selected, in coordination with ADEQ, as opposed to installing the dynamometers at each of the 10 facilities, as a cost saving initiative. Once the equipment was in place, the emissions testing contractor training of staff in the operation of vehicles on the special equipment would begin. Concurrently, ADEQ and the emissions testing contractor would begin a public education campaign to guide owners of the subject vehicles to the appropriate test locations. In addition, ADEQ would be required to amend rules to add full-time four-wheel drive vehicles and those with traction control to the vehicles required to received transient loaded mode testing.

Period Required for Implementation

A formal rule revision and contract amendment would be required. A simple amendment to the existing rules could be processed in approximately six months. Following that, implementation would be completed in approximately six months.

Barriers to Implementation

There are few physical barriers to implementation. Equipment is available for the purpose.

Effectiveness of Measure

This measure would allow the transient testing of that portion of the fleet which cannot now be tested under load. Transient loaded testing has proved to be superior to either steady state loaded or unloaded (idle) testing in the ability to identify problematic conditions in a vehicle in as used situations. The population of constant

four-wheel drive vehicles and those with traction control, which are currently tested at idle, is 4% but is expected to grow significantly during upcoming years. The actual level of emissions reductions achievable by implementing this measure cannot be estimated until additional test data are available.

Accuracy of Effectiveness Determination

There is no assessment of the effectiveness of the measure other than determining the impact on the fleet.

Cost of Measure

The cost of implementing this measure has been estimated by the emissions testing contractor at approximately 15 cents per vehicle, based on the total fleet. Through a contract amendment, the direct cost of installing the necessary equipment will be borne by the contractor. The cost transfer to the program, and ultimately to the vehicle owner, will be through the increased test fees.

Affected Parties

- # ADEQ
- # Commercial light duty fleets
- # Emissions testing contractor
- # Motorists owning full-time four-wheel drive vehicles and those with traction control

STUDY EXPANSION OF AREA A BOUNDARIES

THIS MEASURE APPLIES TO THE
FOLLOWING POLLUTANTS:
VOCs, NO_x, CO, PM₁₀,
HAPs

Background and Description of Measure

While the Nonattainment Area boundary for particulates was revised in 1987, the nonattainment area boundaries for ozone and CO have not changed since 1978. Since then, parts of Maricopa County outside these boundaries have experienced explosive growth.

The boundaries for several of the most effective air pollution control programs for CO and ozone are confined by Arizona statute and local ordinance to the metropolitan Phoenix area within Maricopa County or what State law calls Area A. Programs with coverage limited to Area A include the Vehicle Emissions Inspection Program, cleaner gasoline standards, winter-time fireplace use restrictions, and the Trip Reduction Program (TRP).

The boundary of Area A is currently defined as the boundary of the Maricopa County ozone and CO nonattainment areas. While a designation as nonattainment area automatically imposes certain legal requirements through the CAA, Area A need not be defined coextensively with the nonattainment area boundaries. The Task Force recommends that the benefits and costs of expanding Area A without expanding the nonattainment area boundaries be evaluated by the State.

Considerable population growth has occurred or is planned for several areas outside of Area A. These include the following:

- # The Pinal County portion of Apache Junction, including the Gold Canyon Ranch area
- # New River
- # Rio Verde and the areas north and east of Fountain Hills
- # Developing areas in Pinal County south of Chandler Heights

The purpose of this measure is to further examine potential air quality benefits in the metropolitan area from the application of the air pollution control programs noted above in these areas outside of the current program boundaries. Emissions from these areas can potentially be transported into the Maricopa County nonattainment area and affect efforts to demonstrate attainment of the CO and ozone standard within Maricopa County. Vehicles from outside the boundary are also likely to have higher per vehicle emissions, because they are not subject to emissions testing, and are likely to be operated, at least some of the time, within the nonattainment area.

Implementation Mechanism

The Task Force recommends that the State, utilizing new data to be developed by ADEQ and other agencies, study the potential benefits of expanding Area A. This study could be conducted either by the Joint Legislative

Study Committee on Air Quality Measures or by appropriate legislative committees during the next regular legislative session.

Period Required for Implementation

To be determined by the Legislature.

Barriers to Implementation

Local political leaders in the potentially affected areas have expressed strong opposition to imposing additional air pollution control measures in those areas, which they characterize as generally rural in nature. Those officials also claim that they do not experience violations of the standards in those areas.

In addition, in order to improve the accuracy of the study, examination of 1995 census tract data are needed for all areas, except for Apache Junction to secure accurate population data. Also needed for this study are data on the contribution of vehicles from these areas to traffic in the Nonattainment Area. Surveys would likely be needed to secure this information.

Effectiveness of Measure

ADEQ estimates that expanding the Vehicle Emissions Inspection Program to these areas would reduce vehicular emissions of CO in the entire metropolitan area by 0.8% and 1.1% in 1999 and 2010, respectively. Estimated reductions in vehicle emissions of volatile organic chemicals are 0.4% and 0.7% for 1999 and 2010. Additional benefits may be realized by applying other pollution control measures that are currently in effect in Area A.

Accuracy of Effectiveness Determination

Until census tract population data and traffic surveys are available, the accuracy of this estimate cannot be determined.

Cost of Measure

Unknown.

Affected Parties

- # Arizona Legislature
- # ADEQ
- # Maricopa and Pinal counties
- # Individuals
- # Business
- # Local governments located in the expanded boundary areas

- # EPA
- # MAG
- # Central Arizona Association of Governments

CLEANER BURNING GASOLINE

It has been recognized for a decade that modifying gasoline and diesel fuel formulations has the potential to reduce emissions. The CAA Amendments of 1990 provide several such controls, including requiring oxygenated fuels in CO nonattainment areas, reformulated gasoline in certain ozone nonattainment areas, and national standards for diesel fuel. Since 1988, Arizona has modified gasoline formulations in Maricopa County to address both ozone and CO pollution by controlling gasoline volatility during both summer and winter seasons, and requiring the addition of oxygenates during the winter. However, emissions can be further reduced through additional changes in fuels. The Task Force recommends the following measures to address these issues:

- # Opt into the Federal Reformulated Gasoline Program Beginning in the 1997 Ozone Season
- # Select a Fuel for Long-Term Use (by 1999) Which Will Attain a Minimum of 12 Tons Per day of VOC Reduction
- # Conduct a Study of the Feasibility of Providing Cleaner Burning Gasoline During the Wintertime

OPT INTO THE FEDERAL REFORMULATED GASOLINE PROGRAM BEGINNING IN THE 1997 OZONE SEASON

THIS MEASURE APPLIES TO THE
FOLLOWING POLLUTANTS:
VOCs, NO_x, CO, HAPs

Background and Description of Measure

Motor vehicles are a major source of VOC emissions which contribute to the summertime ozone problem in Maricopa County. These emissions can be markedly reduced with the use of reformulated gasolines.

The Task Force recommends the adoption of federal reformulated gasoline (RFG) specifications effective June 1, 1997 for Area A with a waiver for a limitation on volatility at a maximum of 7.0 psi for the summer ozone season. This measure will substantially reduce HAPs and CO emissions along with ozone. A summary of the federal RFG standards is shown in Exhibit 1.1 to the Assessment of Fuel Formulation Options for Maricopa County (MathPro, 1996).

Implementation Mechanism

The Governor would submit a letter to the EPA Administrator requesting opt-in under the CAA Amendments of 1990. The Governor's Air Pollution Emergency Proclamation would be amended to mandate federal RFG Phase I with a 7.0 psi fuel volatility effective June 1, 1997 as an interim measure until the federal RFG program takes effect through EPA approval of the opt-in. If EPA approval has not been obtained prior to June 1, the State would be required to assume enforcement of the federal RFG Phase I specifications.

Period Required for Implementation

The Assessment of Fuel Formulation Options for Maricopa County (MathPro 1996), indicated that most refiners could likely produce federal RFG Phase I for the 1997 ozone season. However, refiners representing 28% of current supply may have to make at least modest capital investments to produce federal RFG Phase I. This off-the-shelf gasoline program should be able to be quickly implemented and will include either automatic federal or state enforcement, and continuation of Arizona's current Reid Vapor Pressure (RVP) enforcement program.

Barriers to Implementation

As noted earlier, individual refiners may be faced with additional costs and delays in supplying the cleaner fuel and will have to develop systems to comply with the federal RFG Phase I enforcement requirements.

Effectiveness of the Measure

Federal RFG Phase I with 7.0 psi volatility represents the strongest combination of VOC, CO, and HAP emissions reductions that can be implemented for the 1997 ozone season. Federal RFG Phase I will reduce VOC emissions by 9.8 tons/day, NO_x emissions by 0.7 tons/day, and CO emissions by 119 tons/day.

Accuracy of Effectiveness Determination

The benefits and costs were determined in the MathPro report cited earlier.

Cost of Measure

According to the consultant report cited earlier, the total incremental refinery cost is 3.84/gal. Loss of fuel economy due to the use of federal RFG could be as much as 3.74/gal. Thus, the total incremental cost including the fuel economy penalty is 7.54/gal. However, data from other parts of the United States where this fuel is used show that federal RFG Phase I sells for 34/gal. more than conventional gasoline in existing fuel markets. As noted in the MathPro report, there is little correlation between incremental refining costs and price at the pump. The consultant has estimated the cost effectiveness for VOCs at \$25,000 per ton.

Affected Parties

- # EPA
- # ADEQ and Arizona Department of Weights and Measures (ADWM)
- # Petroleum refiners, marketers, and pipeline operators
- # Owners of gasoline powered engines

SELECT A FUEL FOR LONG-TERM USE (BY 1999) WHICH WILL ATTAIN A MINIMUM OF 12 TONS PER DAY OF VOC REDUCTION

THIS MEASURE APPLIES TO THE
FOLLOWING POLLUTANTS:
VOCS, NO_x, CO, PM₁₀,
HAPs

Background and Description of Measure

The Task Force's Fuels Subcommittee, on the basis of the Assessment of Fuel Formulation Options for Maricopa County (MathPro, 1996), recommended three long-term fuel formulations which can reduce VOCs by at least 12 tons per day (based on the emissions inventory referenced in that report): California Air Resources Board (CARB) RFG Phase 2, federal RFG Phase II, and a 10% VOC reduction performance standard. Because the choice of fuel requires data and analysis not available to the Task Force at the time of this report, it was the conclusion that the choice of a fuel from among the three options be left to legislative or gubernatorial action. That choice must, however, be made within the next six months to be implementable by 1999. Since ozone concentrations are also affected by VOC, NO_x, and CO interactions, it is critical that concentrations of these pollutants also be evaluated to ensure a cost-effective, long-term fuel formulation. Other formulations should also be evaluated using Urban Airshed modeling to select the most cost-effective summer fuel for the Maricopa Nonattainment Area. Moreover, the cost of emissions reductions from fuels will need to be compared with the cost of other potential control measures. Feasibility (timing and legal issues), implementation and enforcement issues, and impacts outside of the air attainment area also should be considered.

Implementation Mechanism

Will require either legislative or gubernatorial action in the case of federal RFG Phase II. CARB RFG Phase 2 and the 10% VOC reduction performance measure will require a rule making process to define record keeping requirements, and compliance and enforcement procedures.

Period Required for Implementation

The target for implementation of this measure is the summer of 1999.

Barriers to Implementation

Choice of a fuel will require use of Urban Airshed modeling for the Maricopa County Nonattainment Area to assess estimated impacts on ozone concentrations. The choice will need to be described in the VEOP which is due to EPA by April 1997. Choosing a fuel other than federal RFG Phase II may require compliance with the fuel opt-out procedures prescribed by federal law.

Effectiveness of Measure

This is the single most effective VOC reduction measure proposed in this report. It should reduce VOC emissions by 12 or more tons per day (TPD). Unlike other measures which target only vehicles registered in Area A, this measure will affect anyone purchasing fuel in the nonattainment area, e.g., visitors and owners of unregistered vehicles. All of these reformulations reduce not only VOC and CO emissions but also PM₁₀ and HAP emissions.

Accuracy of Effectiveness Determination

Emission reductions were estimated using EPA approved models. Details are contained in Assessment of Fuel Formulation Options for Maricopa County.

Cost of Measure

Costs depend on the fuel options selected. The estimated costs and cost effectiveness of these fuels are:

Fuel Option	Production Cost (4/gallon)	Mileage Reduction Cost (4/gallon)	Total Cost to Produce (4/gallon)	Maricopa County Cost (\$/day)	Cost-Effectiveness (\$/ton VOCs)
10 % VOC Reduction	4.6	2.1	6.7	\$223,000	16,000
Federal Phase II RFG	5.1	4.2	9.3	\$307,000	23,000
CARB Phase 2 RFG	11.5	5.8	17.3	\$571,000	37,000
Source: <u>Assessment of Fuel Formulation Options for Maricopa County</u> (MathPro, 1996)					

These figures do not represent potential impacts on retail prices of gasoline, which are affected by a variety of other market influences and may or may not rise to the level of the cost to produce.

Affected Parties

All Maricopa County Nonattainment Area motorists. If additional tankage is not built by 1999 that will allow complete segregation of Maricopa County fuels from those provided to the balance of the State, these fuels will not be confined to the County, which may impose additional costs for motorists outside of the nonattainment area for fuel segregation expenses.

CONDUCT A STUDY OF THE FEASIBILITY OF PROVIDING CLEANER BURNING GASOLINE DURING THE WINTERTIME

THIS MEASURE APPLIES TO THE
FOLLOWING POLLUTANTS:
VOCS, NO_x, CO, PM₁₀,
HAPs

Background and Description of Measure

The report, Assessment of Fuel Formulation Options for Maricopa County, demonstrated that reformulated gasolines can provide significant reductions in CO emissions. The Task Force recommends that alternative gasoline formulations be analyzed to determine their potential for reducing CO emissions during the winter months.

Implementation Mechanism

ADEQ has entered into a one year contract with MathPro, Inc., which expires on August 8, 1997. A contract amendment has been drafted to implement this measure (see Attachment 3 of the Maricopa County Nonattainment Area Fuels Subcommittee Report), and could be executed with MathPro once funding for this study becomes available. The current contract can be amended to expire on August 8, 1999. A General Fund appropriation is the anticipated funding mechanism. To implement the study, data on gasoline properties will be collected from refiners in order to establish a baseline for current emissions characteristics and for estimation of additional costs associated with each reformulation option. Such data will be protected as confidential business information by ADEQ.

In addition, ADEQ should convene a group of stakeholders to provide input on and oversight for the preparation of the report.

Period Required for Implementation

Assuming funding is appropriated for the 1998 fiscal year, which begins on July 1, 1997, the study can commence by August 1, 1997 and be completed by November 1, 1997.

Barriers to Implementation

A dedicated funding source is not currently available to conduct this study.

Effectiveness of the Measure

Not applicable. This measure calls for a feasibility study.

Accuracy of Effectiveness Determination

Not applicable.

Cost of Measure

\$45,000 to \$50,000 will be necessary to conduct the study. These funds should be made available as a General Fund appropriation to ADEQ.

Affected Parties

- # ADEQ
- # ADWM
- # Petroleum refiners and marketers
- # Pipeline operators
- # Motorists
- # General public

MEASURES TO MORE EFFECTIVELY CONTROL EMISSIONS FROM MOBILE SOURCES, AND GASOLINE AND DIESEL ENGINES

The role of vehicles in urban air pollution has been well-documented. In the Maricopa Nonattainment Area, vehicles contribute approximately 80% of CO emissions, 25% of ozone forming VOC emissions from on-road mobile sources and a comparable amount from off-road mobile sources, and 80% of PM₁₀ emissions (including reentrainment). Malfunctioning vehicles routinely emit over five times the emissions of properly functioning vehicles. Pre-1980 vehicles account for about one-half of the emissions in the Maricopa Nonattainment Area, but are less than a third of the vehicle population and account for less than a fifth of the miles traveled in the area. Clearly, reducing the vehicular contribution to all three pollution problems will be key to improving air quality here.

Prior to the 1990s, relatively little was known about the contribution of off-road engines. Today, we realize that this machinery makes a significant contribution. For example, mowing a lawn for an hour creates as much total pollution as driving a well-maintained 1993 model year car 2,000 miles.

In addition to enhancements to the IM 240 Program previously described, the Task Force recommends the nine measures presented on the following pages to assist in reducing emissions from these sources.

- # Enhanced Smoking Vehicle Program
- # Adoption of California Off-Road Vehicle and Engine Standards
- # Voluntary Passenger-Vehicle Retrofit Program
- # Voluntary Vehicle Retirement (VVR)
- # Voluntary Lawn Mower Replacement Program
- # Tax Credits to Increase the Effectiveness of the Trip Reduction Program
- # Study the Use of Heavier Gasoline Delivery Trucks Within Arizona; Recommend that State be Authorized to Allow Such Trucks
- # Retrofit Existing Heavy-Duty Diesel Vehicles with a Gross Vehicle Weight of 8,500 Pounds or More for Government-Owned Fleets Granted a Waiver to the Alternative Fuels Fleet Conversion Requirements
- # Study During the PM SIP Development Process of Upgrading Diesel Fuel Specifications

ENHANCED SMOKING VEHICLE PROGRAM

THIS MEASURE APPLIES TO THE
FOLLOWING POLLUTANTS:
PM₁₀

Background and Description of Measure

Enhance the existing Smoking Vehicle Program by improving public education and awareness and by improving the reporting system for complaint activity to increase the number of vehicles notified. The goal is to make reporting easier and response time faster.

Implementation Mechanism

Enhance the existing program to increase public awareness, provide the ability to notify more owners of smoking vehicles, and to protect motorists from harassment which might result from misuse of this program. Maricopa County would receive and log the telephone calls and provide ADEQ with the license plate numbers. ADEQ would process the follow-up letters to vehicle owners.

These are the steps that would be followed in an enhanced Smoking Vehicle Program:

1. Arizona license plate numbers of smoking vehicles would be reported to the Maricopa County Complaints Response Line between the hours of 8:00 a.m. and 5:00 p.m. (after hours: voice mail/existing line). License plate number, date, time, and citizen's name will be recorded. Maricopa County will provide ADEQ with the license plate numbers.
2. ADEQ will send, on a weekly basis, a list of license plate numbers to MVD to determine vehicle owners' address.
3. ADEQ will send a form letter to the registered owner. This letter, which is designed to educate and inform the motorist, will incorporate information on how the vehicle was identified and will explain the law regulating smoking vehicles.

Cost and Effectiveness of Measure

As shown below, total first year costs for enhancing this program are estimated at approximately \$132,900, plus the costs of electronic communication features with MVD, estimated at \$134,000. (Funding for electronic communication has been recommended under the measure entitled **MVD Registration Enforcement and Mandatory Insurance Tracking**. Recurring annual costs are estimated at \$120,500. Experience has shown that where the program is heavily promoted, such as in Pima County, there is strong public support. Other air quality control districts, such as the Bay Area Quality Management District, report that peaks in complaint calls are often associated with periods when the greatest amount of advertising and public outreach occurs. The Task Force recommends that this measure be funded under the new vehicle registration fee described in the measure entitled **Making Vehicle Emissions Program Self-Supporting**).

Resource Need	Estimated Cost
Database programming to replace existing text file	\$20,000
New hardware platform	10,000
Hire two Clerk Typists II, including salary, benefits, overhead, computers and cubicles (includes \$12,400 in on-time costs)	52,900
Establish electronic communication with MVD, including on-going line charges, charges for data runs, etc.	134,000
Annual payment to contractor to convert call-in data to Smoking Vehicle Notifications	50,000
Advertising/public relations (Use existing Maricopa County resources)	0

ADOPTION OF CALIFORNIA OFF-ROAD VEHICLE AND ENGINE STANDARDS

THIS MEASURE APPLIES TO THE
FOLLOWING POLLUTANTS:
VOCs, CO, PM₁₀, HAPs

Background and Description of Measure

Adopt California air pollutant emission standards for off-road vehicles and engines marketed in Arizona beginning in 1999.

Emissions of VOCs, NO_x, and CO from off-road vehicles and engines are a significant source of air pollutants in Maricopa County. The contribution of emissions from off-road vehicles to the total emissions in Maricopa County is:

- # 17% CO
- # 1.5% NO_x
- # 18% VOC

Additionally, emissions from these sources are increasing linearly with population growth. The implementation of this measure will create potentially large reductions in CO and combined NO_x and VOC emissions. Minor reductions in PM are also anticipated as a result of this proposed measure.

In the absence of the more stringent California standards, federal standards would apply in Arizona. This measure will require that engine manufacturers meet more stringent emissions standards at an earlier date than required by the federal standards. Additionally, some of the California standards are more stringent than the federal standards. It is believed that meeting the California emissions standards will be feasible due to the two-year phase in time for the standards to become effective and Arizona's close proximity to the California market. In addition, several manufacturers of engines meeting the California standards are located in Arizona.

Engines and vehicles with more stringent California emission standards include the following:

- # Heavy-duty diesel vehicles (HDDV) rated at 175-750 horsepower (hp)
- # Small utility and lawn and garden equipment engines rated less than 25 hp
- # Recreational vehicles rated less than 25 hp
- # Specialty engines and go-karts, greater than 25 hp
- # Off-road motorcycles and all-terrain vehicles
- # Golf carts (implemented in Maricopa County only)⁵

The emission standards for each of the above engine categories are attached in Tables 1, 2, and 3.

Implementation Mechanism

⁵ The California emission standards for golf carts are applicable in ozone nonattainment areas only.

ADEQ would have to notify EPA of its intent to implement the California standards. State legislative approval would be required for ADEQ or Maricopa County to implement a program to enforce the standards. ADEQ or Maricopa County would need to conduct a formal rulemaking process including public meetings and hearings to address concerns of interested parties and incorporate the new standards.

Period Required For Implementation

According to the CAA, the standards must be adopted at least two years before commencement of such model year. Therefore, if the State Legislature mandated the California standards in early 1997, the model year that the new standards would be applicable to is 1999. The standards may not take effect until model year 2000.

Barriers To Implementation

Standards may have to be imposed Statewide (except the standards for golf carts).

Based on review of CARB documents, the following issues may exist concerning the promulgation of the California standards:

- # There may be concerns associated with the increased use of batteries and the need for battery recycling as a result of the zero emission requirement for golf carts.
- # The CARB documents indicated an increase in NO_x of 6% for the new off-road recreational vehicles and engines standards.
- # The technology for 2-stroke engines may not be available to meet some of the CARB standards; therefore, engine manufacturers may have to utilize 4-stroke engines to meet the standards.
- # CARB found that the adoption of the heavy-duty off-road diesel engine standards may have a significant impact on small businesses who produce earthmoving, agricultural, forestry, and mining equipment. Additionally, it was indicated that there may be a potential cost impact on private persons or businesses.

Effectiveness of Measure

Estimated emission reductions for the year 1999 are:

- # 240 tons per year hydrocarbons (HC)+NO_x
- # 2,540 tons per year CO
- # 5 tons per year PM

The calculations of the annual air pollutant emission reductions are shown in Table 4 for each engine category. These calculations provide an estimate of the emission reductions for the years 1999, 2001, 2010, and 2025. The following assumptions were used in the emission calculations:

- # The equipment/engine turnover rate is 4% per year with complete turnover after 25 years.
- # Emission reductions for the first year the standard is effective have been divided by two to account for the impact evaluated for July 1999, the beginning of the ozone season.
- # To project future base emissions in 1999, the number of vehicles and annual emissions have been multiplied by a factor of 1.29 to reflect a population increase from 1992 to 1999, assuming numbers of engines and vehicles are based upon population.
- # Numbers of diesel small utility engines and associated emissions are not currently available; therefore, the emission reductions for small utility engines represents reductions from gasoline engines only.

Accuracy of Effectiveness Determination

The emissions calculated in the Nonroad Engine Emission Inventories for CO and ozone are for the current nonattainment area. Actual emission reductions may be different than those presented in Table 4 if the emission inventory or the nonattainment area boundaries change.

Cost of Measure

The CARB calculated the cost effectiveness for each of the engine/vehicle categories. A summary of the costs estimated by CARB for the year 1999 is included in Table 5.

Affected Parties

- # Manufacturers of off-road vehicles and engines for which there are applicable standards
- # Commercial purchasers of affected off-road vehicles and engines
- # ADEQ

References

Nonroad Engine Emission Inventories for CO and Ozone Nonattainment Boundaries Phoenix Area, Energy and Environmental Analysis, Inc., Arlington Virginia, August 1992.

State of California Air Resources Board, Public Hearing to Consider the Adoption of Regulations Regarding the California Exhaust Emission Standards and Test Procedures for New 1996 and Later Heavy-Duty Off-Road Diesel Cycle Engines and Equipment Engines, November 22, 1991.

State of California Air Resources Board, Public Hearing to Consider the Adoption of Regulations Regarding California Exhaust Standards and Test Procedures for Off-Highway Recreational Vehicles and Engines, January 13, 1994.

State of California Air Resources Board, Public Hearing to Consider Regulations Regarding the California Exhaust Emission Standards and Test Procedures for 1994 and Subsequent Model Year Utility and Lawn and Garden Equipment Engines, October 22, 1990.

State and Territorial Air Pollution Program Administrators (STAPPA)/Association of Local Air Pollution Control Officials (ALAPCO), Controlling Particulate Matter Under the Clean Air Act: A Menu of Options, July 1996.

TABLE 1: California Off-Road Heavy-Duty Diesel Engine Standards for Model Year 2001 and Later

Net Power (hp)/ Year	Emission Standards (g/bhp-hr)				Opacity Standard A/L/P (%) ¹
	HC	CO	NOx	PM	
175 - 750 hp 2001 and later	1.0	8.5	5.8	0.16	20/15/35
¹ Smoke opacity standards are reported in percent opacity during an acceleration mode, a lug mode, and the peak opacity on either the acceleration or lug modes. Source: STAPPA/ALAPCO, July 1996.					

TABLE 2: California Standards for Model Year 1999 and Later Utility and Lawn and Garden Equipment Engines

Year	Emission Standards (g/bhp-hr)			
	HC and NOx	CO	PM	
Small Utility Engines - Non-Handheld Equipment				
1999 and later	3.2	100	0.25	
Small Utility Engines - Handheld Equipment				
	HC	CO	NOx	PM
1999 and later	50	130	4.0	0.25
Source: STAPPA/ALAPCO, July 1996.				

TABLE 3: California Standards for Model Year 1997 and Later Diesel Recreational Vehicles and Engines

Year	Emission Standards (g/bhp-hr)		
	HC and NOx	CO	PM
Specialty Vehicle Engines Less Than 25 Horsepower			
1999 and later	3.2	100	0.25
Specialty Engines and Go-Karts (>25 hp)			
1997 and later	3.2	100	0.25
Off-Road Motorcycles and All-Terrain Vehicles			
1999 and later	1.2 (HC)	15.0	--
Golf Carts			
1997 and later	zero	zero	zero
Source: STAPPA/ALAPCO, July 1996 and CARB, 1994.			

Table 4: Estimated Emission Reductions from Adoption of California Off-Road Engines

Vehicle/Engine Type	Pollutant	1	2	3	4		5	6			
		Number of Vehicles	Annual Emissions (ton/yr)	California Emission Standard (g/bhp-hr)	1999	2001	Current Emission Standard or Factor	Estimated Annual Emission Reduction (Tons per Year) (6)			
		1999	1999					1999	2001	2010	2025
1 HDDV, 175-750 hp	HC	—	699	—	1	1	—	0	0	0	0
	CO	—	3678	—	8.5	8.5	—	0	0	0	0
	NOx	—	6409	—	5.8	6.9	—	41	368	1022	1022
	PM	—	831	—	0.16	0.4	—	20	179	498	498
2 Small utility and lawn and garden equipment engines, non-handheld equipment (1)	HC + NOx	832908	11867	3.2	—	14.8	186	558	3348	9301	9301
	CO	832908	157595	100	—	417	2396	7188	43129	119803	119803
	PM	832908	258	0.25	—	2.78	5	14	85	235	235
3 Small utility and lawn and garden equipment engines, handheld equipment (1)(2)	HC	446994	3122	50	—	232	49	147	882	2449	2449
	CO	446994	8330	130	—	542	127	380	2279	6332	6332
	NOx	446994	5	4	—	5.36	0	0	0	1	1
	PM	446994	22	0.25	—	2.78	0	1	7	20	20
4 Specialty vehicles <25 hp (3)	HC + NOx	522	1	3.2	—	5	0	0	0	0	0
	CO	522	14	100	—	357	0	1	4	10	10
	PM	522	0	0.25	—	—	—	—	—	—	—
5 Go-Karts and Specialty Vehicles >25 hp (4)	HC + NOx	3255	49	3.2	—	5	0	1	6	18	18
	CO	3255	89	100	—	357	1	4	23	64	64
	PM	3255	0	0.25	—	—	—	—	—	—	—
6 Off-road motorcycles and all-terrain vehicles - 2 Stroke(5)	HC	2888	58	1.2	—	15	1	3	19	53	53
	CO	2888	70	15	—	20	0	1	6	17	17
7 Off-road motorcycles and all-terrain vehicles - 4 Stroke (5)	HC	13258	3	1.2	—	1.5	0	0	0	1	1
	CO	13258	27	15	—	32	0	1	5	14	14
8 Golf Carts - 2 Stroke	HC	307	101	0	—	1283.44	2	6	36	101	101
	CO	307	121	0	—	1520	2	7	44	121	121
	NOx	307	0	0	—	1.5	0	0	0	0	0
	PM	307	1	0	—	8.2	0	0	0	1	1
9 Golf Carts - 4 Stroke	HC	1001	54	0	—	266.44	1	3	20	54	54
	CO	1001	484	0	—	1852.5	10	29	174	484	484
	NOx	1001	1	0	—	3.6	0	0	0	1	1
	PM	1001	1	0	—	4.14	0	0	0	1	1
TOTAL EMISSION REDUCTION (TONS PER YEAR)							HC + NOx	240	760	4680	13001
							CO	2537	7611	45664	126846
							PM	5	35	272	756

HDDV - Heavy-duty diesel vehicle

Emissions and vehicle count estimates for 1999 derived by formula from population.

(1) Gasoline, diesel, and alternative fueled small utility engines <25 hp

- Population of lawn mowers, front mowers, tillers, lawn and garden tractors, wood splitters, chip/stump grinders, commercial turf equipment, generator sets, pumps, air and gas compressors, welders, pressure washers and chainsaws from Nonroad Engine Emission Inventories for CO and Ozone Nonattainment Boundaries Phoenix Area.

- Emission factor is average value for all engine sizes

- CA estimates a 91 % PM, 76% CO, and 82% HC emission reduction from utility engines

(2) Population of trimmers/edgers/brush cutters, leaf blowers/vacuums, chainsaws, shredders, and other lawn and garden equipment from Nonroad Engine Emission Inventories for CO and Ozone Nonattainment Boundaries Phoenix Area.

- Emission factor is average value for all engine sizes

(3) The population of recreational vehicles consist of the minibike category presented in the Non Road Engine Emission Inventory.

(4) The population of specialty engines and go-karts consists of specialty vehicle carts in the Nonroad Engine Emission Inventory.

- CA estimates a 72% reduction in CO and a 35.7 % reduction in HC and NOx combined.

(5) Emission factor units g/km, from State of California Air Resources Board, Staff Report: Initial Statement of Reasons for Proposed Rulemaking, November 23, 1993.

Annual usage assumes each vehicle is operated at 25 mph (40.23 km/hr)

(6) Emissions decreases for the first year the emission standards are in effect have been divided by 2 to account for the impact evaluated for July 1999, the beginning of the ozone season.

Sample Calculation: CO reduction from small utility engines in 1999:

157,595 ton/yr emissions x ((417-100)/417) emission reduction x 0.5 (Jan. to June, 1999, half-year) x 0.04 annual turnover = 2,396 ton/yr 1999

Table 5: Cost Effectiveness Calculated by CARB

Vehicle/Engine Type	Pollutant	Estimated Cost Effectiveness (\$/ton)
HDDV, 175-750 hp	NOx	\$320 to \$2,200
	PM	\$5,320 to \$10,160
Small utility engines, handheld and non-handheld equipment	HC	\$4,000 to \$22,000
	NOx	\$2,000 to \$ 24,000
Specialty Engines and Go-Karts	HC + NOx	\$360 to \$540
	CO	\$20
Off-road motorcycles and all-terrain vehicles - 2 Stroke	HC	(1)
	CO	
Off-road motorcycles and all-terrain vehicles - 4 Stroke	HC	\$60 to \$700
	CO	\$60 to \$620
Golf Carts	HC + NOx	\$680
	CO	\$160

(1) CARB indicates that the technology needed to bring the 2-stroke engine into compliance with the proposed standard is currently unproven, and even if it were, it would likely be costly. Instead manufactures will probable elect to replace their 2-stroke engines with 4-stroke models.

VOLUNTARY PASSENGER-VEHICLE RETROFIT PROGRAM

THIS MEASURE APPLIES TO THE
FOLLOWING POLLUTANTS:
VOCs, NO_x, CO, HAPs

Background and Description of Measure

This measure would provide subsidies for the installation of an emission upgrade kit (catalyst) designed to reduce the exhaust emissions from automobiles. The emission upgrade kits would be available on a voluntary basis to the worst polluting vehicles failing the inspection/maintenance test. This program provides an alternative to owners of older vehicles that simply cannot afford a new vehicle, and have a vehicle in sufficiently good condition to be subject to retrofit unlikely to benefit from a voluntary vehicle retirement program. A similar measure has been underway in San Diego County, California since May 1996. The initial results of this program have been positive.

Implementation Mechanism

The San Diego program issues a request for proposal every year for emission reduction projects. Once the contract is awarded, the contractor is responsible for implementation of the program with minimal oversight by district personnel.

A similar Arizona program would require statutory authority for ADEQ, after competitive bidding, to enter into a contract with a retrofit provider who would subcontract with repair facilities to perform tune-ups, repair exhaust systems, and install emissions upgrade kits. One criteria of the competitive bidding would be demonstration that the proposed retrofit system complied with the EPA Aftermarket Retrofit Device Evaluation Program requirements. The same legislation providing program authority would also need to include a provision that defeating or removing the retrofit system would be considered to be tampering under State law. The Task Force recommends that this measure be funded by the new vehicle registration fee described in the measure entitled Making Vehicle Emissions Programs Self-Supporting.

Period Required for Implementation

Six months to one year for program development after legislative action.

Barriers to Implementation

Lack of authority and funding.

Effectiveness of Measure

The measure was selected for cost-effectiveness, low administration cost, and high vehicle owner satisfaction. Federal Test Procedure (FTP) laboratory measurements of 13 vehicles indicate emission reductions of 80% hydrocarbons, 81% CO and 69% nitrogen oxides after retrofit. The same testing procedure indicated an emission reduction of 32% hydrocarbons, 49% CO, and 17% NO_x for vehicles receiving a tune-up only. The goal in San Diego is to retrofit 1,200 vehicles over a three-year period. The Task Force proposes a similar goal although the program could be expanded if results warrant it.

According to emission reductions shown in California, and assuming an annual vehicle mileage of 10,000 miles per year, the annual emission reductions from retrofitting 400 vehicles annually would be:

- # 9 tons HC
- # 170 tons CO
- # 6 tons NO_x

Accuracy of Effectiveness Determination

The projected emissions reductions are provided. However, information regarding actual emission reductions from the retrofit of the vehicles in San Diego are not yet available.

Cost of Measure

The cost of retrofitting older vehicles is estimated at approximately \$500/vehicle. In addition to the cost of the vehicle retrofit, the vehicle may need a tune-up and exhaust system repairs, costing the vehicle owner approximately \$225. In San Diego, the county pays for the retrofit of the vehicles and the vehicle owner is responsible for the cost of the tune-up and exhaust system repairs, if required. The Task Force recommends the same division of responsibility for the Arizona program. The cost of the program will be \$600,000 annually. San Diego estimates \$13,369 per ton reduction of VOCs and NO_x. The estimated cost for the reduction in CO is \$1,706 per ton, based upon 400 vehicles at \$725/vehicle.

Affected Parties

- # Owners of older high-polluting vehicles
- # ADEQ to administer the program
- # Contractor
- # Repair facilities installing retrofit kits

VOLUNTARY VEHICLE RETIREMENT (VVR)

THIS MEASURE APPLIES TO THE
FOLLOWING POLLUTANTS:
VOCS, NO_x, CO, PM₁₀,
HAPs

Background and Description of Measure

Numerous studies, including a recent 1994 CARB pilot study, conclude that a relatively small number of vehicles have a disproportionate impact on air quality. These vehicles are principally either older model year vehicles or vehicles that are not well maintained. The older vehicles, which can be defined as being 12 or more years older than current model year vehicles, are especially prevalent in Arizona because the State has one of the oldest vehicle fleets in the country.

A voluntary vehicle retirement (VVR) program in Maricopa County would provide vehicle owners with the voluntary option of replacing high- or gross-emitting older vehicles with newer technology, better maintained vehicles. This would accelerate the turnover of the existing vehicle fleet and reduce the total on-road CO emissions inventory. Because of the larger number of older vehicles in Arizona, a VVR program is likely to be more effective in improving air quality in Arizona than in other states.

Implementation Mechanism

A VVR program would require the approval of the Arizona Legislature as a SIP measure. It should be designed in light of experience gained from California's successful VVR program. The Arizona program would have to ensure that the vehicles retired had actually been titled, registered, and operable in the nonattainment area for a reasonable period of time, say the prior 24 months. It should also be designed to address concerns voiced in the past by making it completely voluntary, excluding listed classic cars, salvaging parts, and only retiring vehicles that cannot be retrofitted with emission control systems.

Period Required for Implementation

A VVR program could be operational within a year following legislative approval, and would last about 10 years.

Barriers to Implementation

The major barriers are cost and acceptability to affected vehicle owners and the groups that represent them, as well as groups that rely on the contribution of older vehicles as a form of fund raising.

Effectiveness of Measure

Sierra Research Inc. estimated the possible emission reduction benefits in an April 1996 study report for the Western States Petroleum Association (WSPA). The report estimates that as much as 2% of the mobile source CO emissions inventory could be eliminated with a 10 year, 10,000 vehicle per year VVR program that targets high-emitting vehicles. Since the mobile source CO inventory exceeds 500 TPD, the emissions reduction benefits could be greater than 10 TPD for this specific program. Emissions of VOCs, which contribute to ozone formation, would be reduced as well. A more modest, 4,000 vehicle per year, targeted VVR program could reduce emissions of CO by 4 TPD, VOCs by 0.4 TPD, and NO_x by 0.1 TPD.

Accuracy of Effectiveness Determination

Effectiveness was determined by studies conducted by outside parties. The Task Force relied upon these reports but the conclusions contained in the reports could not be independently verified.

Cost of Measure

A 4,000 vehicle per year program will cost \$4 million annually. Sierra Research Inc. computed the cost effectiveness of this targeted program to be \$3,400 to \$4,500 per ton of CO emissions eliminated and \$25,200 to \$27,700 per ton of VOC emissions. This is likely to be significantly more cost effective than most other CO emission reduction measures. The Task Force recommends that the program be funded by a new vehicle registration fee described in the measure titled **AMaking Vehicle Emissions Programs Self-Supporting.**@

Affected Parties

- # Vehicle owners with vehicles more than 12 years older than the current model year.
- # Groups that rely on the contribution of older vehicles as a form of fund raising.

VOLUNTARY LAWN MOWER REPLACEMENT PROGRAM

THIS MEASURE APPLIES TO THE
FOLLOWING POLLUTANTS:
VOCS, NO_x, CO, PM₁₀,
HAPs

Background and Description of Measure

Lawn mowers have virtually no emission control equipment for any criteria air pollutants. In California, CARB implemented Tier I emission controls for CO, total hydrocarbons, and NO_x. These controls commenced with 1995 model year mowers and will be even more stringent when Tier II controls are effective in 1999. CO emissions will be reduced by as much as 65 to 70%. In another measure the Task Force urges adoption of the CARB standards for lawn mowers but until those standards become effective, which could be as long as six to eight years in the future, something must be done with existing lawn mowers.

Commercial businesses, cities, and municipalities operate lawn mowers and other landscape equipment as much as 40 to 60 hours per week. Residential users operate lawn mowers and other landscape equipment as much as 1 to 2 hours per week. Although a lawn mower replacement program could be applied to both commercial and residential sectors, the commercially focused component of the program is expected to yield the greatest benefits.

Implementation Mechanism

Recent lawn mower replacement pilot programs by the Salt River Project and WSPA indicate that a full program could be implemented successfully. Such a program would require the approval of the Arizona Legislature as a SIP measure. It could be administered through local lawn mower retailers, with oversight and coordination provided by ADEQ or another governmental agency.

Period Required for Implementation

This program could be operational within months following the Legislature's approval, depending upon the availability of program funding sources.

Barriers to Implementation

Cost and making the availability of the program known to the affected population.

Effectiveness of Measure

EPA, CARB, and the South Coast Air Quality Management District (SCAQMD) have all completed testing programs to quantify the emissions of lawn mowers with virtually no emission controls. Based on these

programs, CO emission reductions could be very significant. Off-road mobile CO emissions in Maricopa County have previously been estimated in 1995 at 108 TPD, and may be understated. Lawn mowers are believed to be a significant portion of off-road mobile emissions. Sierra Research has estimated that a 2,000 lawn mower per year program, based on EPA's estimated emission factors, could reduce emissions of CO by .66 TPD and VOCs by 2.86 TPD. Expansion of the program to include more commercial lawn mowers, or even residential lawn mowers, could further reduce emissions. The program could last for five years, extending past the year 1999 when Maricopa County is required to attain the federal ozone standard and the tighter CARB Tier II controls take effect.

Accuracy of Effectiveness Determination

Effectiveness was determined by studies conducted by outside parties. The Task Force relied upon these reports but the conclusions contained in the reports could not be independently verified.

Cost of Measure

A small five-year program could replace 2,000 small commercial lawn mowers each year at an annual cost of about \$500,000. Depending upon the emission reduction methodology used, the cost effectiveness for such a program could be as much as \$3,964 per ton of CO emissions eliminated and \$1,227 per ton of VOC emissions.

This is very likely to be significantly more cost effective than most other CO and VOC emission reduction candidate measures. Expansion of the program to include more commercial, or even residential, lawn mowers would increase the program cost and likely reduce its cost effectiveness. The Task Force recommends that the program be funded by the new vehicle registration fee described in the measure titled **AMaking Vehicle Emissions Programs Self-Supporting.**@

Affected Parties

Owners of domestic and commercial lawn mowers.

TAX CREDITS TO INCREASE THE EFFECTIVENESS OF THE TRIP REDUCTION PROGRAM

THIS MEASURE APPLIES TO THE
FOLLOWING POLLUTANTS:
VOCS, NO_x, CO, PM₁₀,
HAPs

Background and Description of Measure

This measure would allow employers participating in TRPs in Areas A and B a 50% tax credit of actual costs or up to \$100,000 for subsidizing employees' public transit fares, vanpool, and carpool expenses. This would be available to corporations, partnerships, single proprietorships, and shareholders of a Subchapter S corporation. The credit may not exceed the amount of taxes otherwise due; however, the taxpayer may carry forward any credit up to five years. To qualify, the taxpayer must participate in a mandatory TRP and include all activities for which the credit is claimed in the approved TRP plan. Maricopa County has an ongoing monitoring program that verifies that employers are implementing measures in the approved TRP plans that will help prevent abuse of the claims taken under this tax credit. Under the proposed legislation, the credit would be provided in lieu of any other credit or deduction. This measure would allow a *one-time only* 25% tax credit, or up to \$15,000, whichever is less, for telecommuting equipment purchased and owned by the employer and which is used for telecommuting purposes by the taxpayer's employee. Allowable equipment would include computer hardware and software, modems, telephones (or installation costs) that enable the employee of the taxpayer to perform the employee's normal employment duties at home instead of at the workplace. This would *exclude* the purchase or replacement of equipment for exclusive use at the taxpayer's worksite or if the taxpayer's main business is in the taxpayer's home.

The following states have similar tax credit legislation components: California, Connecticut, Delaware, Oregon, Washington, and New Jersey. An in lieu of taxes provision would allow some utilities to take advantage of this via the voluntary in lieu payments they make to the State. The most recent phone survey done by the Regional Public Transportation Authority (RPTA) asked the general public about possible solutions to the Valley's air pollution and traffic problems. Providing employer tax credits to employers who subsidize employees who take the bus, vanpool, or carpool ranked second (after improving the Valley's bus system), with 77% of respondents agreeing.

Implementation Mechanism

- # This will require an amendment to the State tax code.

Period Required for Implementation

- # Would be effective 90 days after enactment
- # A sunset provision after five years, would allow time to evaluate the impacts

Barriers to Implementation

Preventing abuse of the credit, especially for telecommuting equipment, is the most significant barrier to implementation. A certification form and process would be set up where Maricopa County would certify the proper use of funds for the intended purposes and an approvable TRP plan would have to document that any measure claimed for a credit is in the plan and is being implemented. This is done in Oregon, where a tax credit is available for telecommuting equipment; the same procedures could be adapted for use in Arizona. Guidelines would outline how and under what circumstances the employers could take advantage of these credits.

Effectiveness of Measure

This measure is designed to encourage more small- and medium-sized employers to provide the more effective, financial incentives to their employees, that typically find it more difficult to afford these incentives. The effectiveness of this measure is difficult to estimate because participation is voluntary, although past experience with these types of measures suggests that this measure could be highly effective.

Accuracy of Effectiveness Determination

Costs for this measure were developed by first using actual amounts of funds currently being spent in Maricopa and Pima counties by private sector employers involved in the TRP, and then projecting a 50% to 100% increase in participation due to the credit and calculating a 50% credit.

Cost of Measure

Estimated at \$700,000 to \$900,000 in the first year in lost tax revenue and up to \$1.8 million by the fourth or fifth year.

Affected Parties

Employers and employees who would benefit from the incentives provided.

STUDY THE USE OF HEAVIER GASOLINE DELIVERY TRUCKS WITHIN ARIZONA; RECOMMEND THAT STATES BE AUTHORIZED TO ALLOW SUCH TRUCKS

THIS MEASURE APPLIES TO THE
FOLLOWING POLLUTANTS:
PM₁₀

Background and Description of Measure

The Task Force recommends that ADOT study the effect upon Arizona roadways of the use of a heavier gasoline delivery truck configuration named the A105" and that the Arizona Legislature should consider adopting a resolution urging Congress to delegate authority to the states to allow use of heavier gasoline delivery trucks.

The name A105" is derived from the truck's weight of 105,000 pounds. While heavier fuel tanker trucks are already used in other western states including Nevada, Utah, Oregon, and Washington, states are currently precluded by federal law from allowing larger trucks on their respective roadways. Arizona currently allows a truck tanker weight limit of 80,000 pounds. Once Congress grants states such authority, further action would be needed to revise the criteria for road-worthy vehicles within Arizona.

Implementation Mechanism

ADOT would conduct a study of the effect of using larger trucks within Arizona. The study would include safety and roadway stress issues. Data on air quality issues would be obtained from ADEQ.

Period Required for Implementation

The ADOT study could begin immediately.

Barriers to Implementation

ADOT may not have available resources and staff time to conduct a study.

Effectiveness of Measure

Conducting a study would have no air quality impacts. If Arizona were to allow heavier trucks, gasoline delivery trucks could travel up to 22% fewer miles, according to some estimates. The precise reduction in PM emissions, from roadway dust and combustion products, would need to be determined. Use of these trucks could also reduce traffic congestion, energy consumption, highway repairs, and delivery costs.

Accuracy of Effectiveness Determination

The reductions in particulates generated from allowing A105" trucks on Arizona roadways are not presently known and there is no independent verification of the reduction in VMT.

Cost of Measure

Minimal costs if the study is conducted by ADOT staff. There would be an undetermined cost if ADOT does not have in-house expertise and would need an outside contractor. The study scope may include costs and benefits of allowing A105" trucks in Arizona.

Affected Parties

- # Arizona trucking industry
- # ADOT
- # Arizona Department of Public Safety
- # ADEQ
- # Motorists

RETROFIT EXISTING HEAVY-DUTY DIESEL VEHICLES WITH A GROSS VEHICLE WEIGHT OF 8,500 POUNDS OR MORE FOR GOVERNMENT-OWNED FLEETS GRANTED A WAIVER TO THE ALTERNATIVE FUELS FLEET CONVERSION REQUIREMENTS

THIS MEASURE APPLIES TO THE
FOLLOWING POLLUTANTS:
VOCs, PM₁₀, HAPs

Background and Description of Measure

In order to reduce air pollutant emissions in Maricopa County, the State Legislature implemented a program requiring cities and towns, school districts, State, counties, and the federal government to convert a percentage of their fleet vehicles to use alternative fuels by dates specified in legislation. The legislation provided that if the government agency could show that the cost of converting vehicles was prohibitive, they could receive a waiver from the alternative fuels program. To date, few government agencies within Maricopa County are meeting their targets in the program and almost all governmental entities have asserted a right to the waiver. The purpose of this proposed measure is to require government agencies that are not going to meet their targets and that have obtained a waiver to contribute to a reduction in vehicular air pollutants by retrofitting a percentage of their diesel fleet vehicles with EPA-certified technology. This technology is effective in reducing PM emissions by 25%. The following two actions are proposed to implement this measure.

The State should adopt legislation to require public fleets receiving waivers to retrofit fleet heavy-duty diesel vehicles registered in Area A that are the subject of the waiver with a technology that is effective at reducing PM₁₀ emissions by 25% or more and that has been approved by the EPA under the Urban Bus Engine Retrofit/Rebuild Program. This program would be applicable to fleet diesel vehicles with a gross weight of 8,500 pounds or more, model year 1993 and older. Fleet vehicles affected by this proposed measure include those owned and operated by cities and towns, school districts, State, counties, and the federal government. In addition to PM emission reductions, the retrofit of diesel vehicles with technology such as oxidation catalysts may reduce diesel hydrocarbon and CO emissions by approximately 50%.

The legislation imposing the retrofit requirement should require ADEQ to evaluate whether the program should be expanded to apply to other public vehicles and private vehicles based upon a study that would include cost, public health benefits, and potential funding sources.

Under current legislation a diesel powered motor vehicle with a gross vehicle weight of more than twenty-six thousand pounds within Maricopa County will not be allowed to operate in Maricopa County unless it was manufactured in or after the 1988 model year or is powered by an engine that is certified to meet or surpass emissions standards contained in 40 CFR Section 86.088-11. This is not applicable to vehicles that are registered pursuant to Title 28, Chapter 2, Article 1.1.

The implementation of this proposed control measure should reduce PM from public fleet vehicles applicable to the alternative fuels fleet conversion program with a gross vehicle weight of 8,500 pounds or greater. Therefore, vehicles not required to reduce PM emissions under existing law may be required to reduce PM

emissions under this control measure. Expanding the proposed measure to include other public diesel vehicles and private vehicles of such gross vehicle weight would be evaluated by the Arizona Legislature.

Implementation Mechanism

School district, city, county, State, and federal fleet vehicles are currently required to convert a percentage of their fleet to alternative fuel vehicles by timeframes specified in various sections of State law. They are provided a waiver from this requirement if the costs of converting to the alternative fuels are prohibitive. Based on the applicable statutes, the waiver is granted if the cost of the equipment or refueling facilities compared with the costs associated with the continued use of conventional gasoline or diesel fuels measured over the expected useful life of the equipment or facilities supplies exceeds the following percentages:

- # Cities and towns - 10%
- # School districts - 10%
- # State - 30%
- # Counties - 10%
- # Federal - 30%

This measure proposes to require that fleets qualifying for the above waiver shall be required to retrofit applicable diesel vehicles within their fleet with EPA-approved technology (such as catalytic oxidation catalysts) that is effective at reducing PM₁₀ emissions by 25% or greater. The amount of money spent retrofitting diesel fleet vehicles shall not exceed the amount of money that is equal to the waiver amount stated in each of the applicable statutes and required to be filed with the Arizona Department of Commerce.

Implementation of this measure would require enacting amendments to the following statutes governing fleet vehicles in cities and towns, school districts, the State, counties and federal entities:

- # Cities and towns - ARS ' 9-500.04
- # School districts - ARS ' 15-349
- # State - ARS ' 41-803
- # Counties - ARS ' 49-474.01
- # Federal - ARS ' 49-573

The cost of retrofitting the diesel vehicles, if required, would be born by the affected government agencies.

Period Required for Implementation

Once approved by the Legislature, affected fleets which have received waivers for conversion of fleet vehicles to alternative-fueled vehicles shall have the following time periods to retrofit their existing diesel vehicles:

- # One year after legislative approval - 25% of diesel fleet vehicles
- # Two years after legislative approval - 40% of diesel fleet vehicles
- # Three years after legislative approval - 60% of diesel fleet vehicles
- # Four years after legislative approval - 80% of diesel fleet vehicles
- # Five years after legislative approval - 100% of diesel fleet vehicles

Barriers to Implementation

- # Cost to both public and private sector
- # Limited local experience with available technology

Effectiveness of Measure

A brief description of the regulatory framework and anticipated emission reduction associated with the control of PM from heavy-duty diesel vehicles is provided in the following paragraphs. Additionally, a synopsis of a research report on the effects of fuel modification and emission control devices on heavy-duty diesel engine emissions is attached.

Vehicle registration information for the year 1994 indicates a total of 106,490 heavy duty diesel vehicles registered in Maricopa County. The 1991 MAG SIP indicates particulate emissions from heavy-duty diesel vehicles were 1,032 tons per year in the year 1989, approximately 42% of the total emissions from on-road vehicles. The quantity of urban buses (which are already required to reduce particulate emissions) included in the vehicle registration information and the SIP emission estimates is unknown.

An example of anticipated annual PM reductions for the retrofit of 100 vehicles with equipment capable of reducing PM emissions by 25% is attached. Based on this calculation, the PM emission reduction for the retrofit of 100 heavy-duty diesel vehicles would be 1,229 pounds per year.

Oxidation catalysts are also capable of reducing hydrocarbon and CO emissions by approximately 50%.

Accuracy of Effectiveness Determination

The effectiveness determination utilizes an EPA emission factor and local information regarding heavy-duty diesel vehicle quantities and ages. A 25% reduction in PM is used as the basis for the calculation. This is the minimum requirement for PM reductions for EPA approval of the control technology under the Urban Bus Retrofit Program. Actual PM reductions may be greater than 25%.

Cost of Measure

Approximate cost to purchase diesel oxidation catalyst in large quantity is \$1,000 per unit. The cost is approximately \$2,000 per unit when purchased individually. Based on a 10-year life span of the oxidation catalyst, the cost per ton reduction of PM for this measure would range from \$16,273 to \$32,547 per ton PM.

Affected Parties

Fleet heavy-duty diesel vehicles with a gross weight of 8,500 pounds or higher, model years 1993 and older operated and maintained by the following:

- # Cities and towns
- # School districts
- # State
- # Counties
- # Federal

CALCULATION OF PARTICULATE MATTER REDUCTIONS FROM RETROFIT OF HEAVY-DUTY DIESEL VEHICLES *

Sy

$$\frac{104,700 \text{ vehicle miles traveled (VMT)}}{\text{day}} \times \frac{0.067 \text{ heavy duty diesel VMT}}{\text{total VMT}} = \frac{3,678,615 \text{ heavy duty diesel VMT}}{\text{day}}$$

Device

3,678,615

$$\frac{3,678,615 \text{ heavy duty diesel VMT/day}}{106,490 \text{ heavy duty diesel vehicles (HDDV)}} \times \frac{365 \text{ day}}{\text{year}} = \frac{12,609 \text{ heavy duty diesel VMT}}{\text{vehicle/year}}$$

$$\frac{12,609 \text{ heavy duty diesel VMT}}{\text{vehicle/year}} \times \frac{0.0039 \text{ lb PM}}{\text{VMT}} \times 25\% \text{ PM reduction} \times 100 \text{ vehicles} = \frac{1,229 \text{ lb PM}}{\text{yr}}$$

AP-42

The emission factor of 0.0039 lb PM/VMT is from the EPA document "AP-42" for heavy duty diesel vehicles, taking into account the average emissions for the in-use heavy duty vehicle fleet.

HEI Statement

ADEO
AIR QUALITY DIVISION

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Synopsis of Research Report Number 76

Effects of Fuel Modification and Emission Control Devices on Heavy-Duty Diesel Engine Emissions

BACKGROUND

Diesel engine exhaust contains small carbonaceous particles and a large number of chemicals that are adsorbed onto these particles or present as vapors. Diesel exhaust is a public health concern because (1) the particles are an important component of air pollution, (2) the particles are small enough to be inhaled deeply into the lungs where they may persist, and (3) the vapors and particles include mutagens, carcinogens, lung irritants, and contributors to ozone formation. Epidemiologic studies of workers in certain occupations suggest a weak association between exposure to diesel exhaust and lung cancer. Other studies have found that daily increases in mortality from heart and lung diseases are correlated with increases in particulate air pollution. The Clean Air Act of 1970 mandates decreased particle emissions from vehicles with diesel engines. Although engine manufacturers have reduced emissions substantially by improving engine designs, fuel composition may need to be modified and emission control devices may need to be added to achieve further reductions in the future. Because the Clean Air Act requires that such devices contribute no new risks, the Health Effects Institute sponsored this study to help evaluate whether using low-sulfur fuel with emission control devices might alter diesel emissions in ways that could affect human health.

APPROACH

Dr. Susan Bagley and colleagues conducted a laboratory study to characterize the physical and chemical composition and the mutagenicity of emissions from a heavy-duty 1988 diesel engine equipped with a ceramic particle trap. This engine was operated with low-sulfur fuel at a constant speed under two different load conditions. The investigators compared their results to those obtained in an earlier study (HEI Research Report Number 56) in which they had used the same engine and a conventional, high-sulfur fuel. They also studied the effects of an oxidation catalytic converter on emissions from a heavy-duty 1991 diesel engine using a low-sulfur fuel. A unique aspect of this study was that the investigators determined the number and size of particles within the two typical classes of diesel particulate matter: the small, primary particles (nuclei mode) and the larger particle agglomerates (accumulation mode).

RESULTS AND IMPLICATIONS

The ceramic particle trap substantially decreased the weight and number of particles emitted, and as a result, lowered the levels of organic chemicals associated with particles and the mutagenicity of diesel exhaust. Use of the trap caused an increase in the amount of one chemical (fluoranthene) in the emission vapors, but no statistically significant changes were noted in the amounts or types of other vapor-phase chemicals. Regenerating the particle-loaded trap by heating it to combust the particles produced negligible increases in emission constituents and mutagenicity. Compared with results from conventional, high-sulfur fuel in the earlier study, low-sulfur fuel decreased sulfate emissions and the number of small sulfate particles, but had little effect on the weight of total particulate matter. The oxidation catalytic converter on the other hand had no effect on the number of particles, but decreased the amount of organic chemicals in the vapors and adsorbed onto the particles. Because most of the chemicals adsorbed onto the particles were removed, the weight of the total particulate matter decreased. These results indicate that the use of low-sulfur fuel in combination with emission control devices reduces selected pollutants in heavy-duty diesel engine exhaust without significantly increasing emissions of other pollutants. Preliminary results show that, despite a substantial reduction in the weight of total particulate matter, the total number of particles in emissions from the more advanced 1991-model engine was 15 to 35 times greater than the number of particles from the 1988 engine when both engines were operated without emission control devices. This unexpected finding was due to a 30- to 60-fold increase in the number of small, primary particles. These data are of concern because the smaller particles in emissions are more likely to be trapped and retained in human lungs. However, these findings need to be validated because only one engine of each type was tested and the main objective of this study was not to compare different engines. Further inquiry, including studies with new diesel engine designs, is needed to clarify this potentially important result.

STUDY DURING THE PM SIP DEVELOPMENT PROCESS OF UPGRADING DIESEL FUEL SPECIFICATIONS

THIS MEASURE APPLIES TO THE
FOLLOWING POLLUTANTS:
PM₁₀, NO_x

Background and Description of Measure

The Task Force recommends that diesel fuel specifications be studied during the SIP development process for the Serious Area Particulate Plan due to be submitted to EPA on December 10, 1997 before an upgrade to those specifications is considered.

Implementation Mechanism

MAG will initiate review and public discussion relating to the benefits, costs, and impacts associated with changing diesel fuel specifications. The initial review would be performed by MAG in association with ADEQ, Maricopa County, petroleum refiners, diesel engine manufacturers, stationary sources, representatives of the trucking industry, and other interested parties.

Period Required for Implementation

The initial review of the impacts and benefits associated with changing the diesel fuel specifications may begin immediately.

Barriers to Implementation

Since this proposed measure involves only the consideration of changing the diesel fuel specifications, there are no barriers to the implementation of this control measure. MAG has no additional funds to perform a study of the magnitude proposed by this measure.

Effectiveness of Measure

The SIP revisions due in December 1997 require the inclusion of BACM which are to be implemented no later than four years from the date of reclassification. The use of reformulated diesel fuel may be considered a BACM capable of reducing PM emissions. Investigating the use of reformulated diesel fuel as part of the SIP revision would be an effective step in the process of evaluating potential BACMs for the nonattainment area. Because the implementation of CARB diesel has the potential for reductions in NO_x, this measure must also be evaluated in light of its impact on ambient levels of ozone as well as PM.

Accuracy of Effectiveness Determination

In *Controlling Particulate Matter Under the Clean Air Act* by STAPPA and ALAPCO, dated July 1996, it is indicated that the quality of diesel fuel directly and indirectly affects the level of PM emissions from diesel-fueled engines. Based on the current research, STAPPA/ALAPCO recommends to "consider adopting reformulated diesel fuel requirements, including the California reformulated diesel fuel program, to achieve additional reductions from diesel engines." This measure will provide a mechanism for that consideration.

Cost of Measure

Costs associated with the consideration of utilizing reformulated diesel fuels would involve personnel time required to research, evaluate, and receive public comments regarding the measure. These costs should be minimal.

Affected Parties

- # Maricopa County Association of Governments
- # ADEQ
- # Petroleum refiners
- # Owners of diesel-powered vehicles such as fleet vehicles and trucking companies
- # Other stakeholders

MORE EFFECTIVE CONTROL OF POINT SOURCE POLLUTION

The terms **Apoint source@or Astationary point source@**refer to a wide variety of commercial and industrial facilities which emit air pollution from an identifiable stack, vent, or other opening. Most point sources are required to obtain air pollution control permits or are otherwise subject to pollution control requirements. Largely due to the long history of controlling point sources and the relative level of point source emissions as compared to other emission sources, such sources are a relatively small contributor to air quality problems in the Maricopa Nonattainment Area. However, there are cost-effective ways of further reducing emissions from these facilities.

The Task Force recommends the five measures presented on the following pages address emissions from these sources.

- # Increasing Effectiveness of Existing Maricopa County Regulatory Enforcement Programs
- # More Stringent Standards for Solvent Cleaning
- # Expanded Enforcement of Stage II Vapor Recovery Requirements
- # Permit Amnesty Program
- # Analysis of the Feasibility of an Inter-Source Emission Credit Trading and Banking Program

INCREASING EFFECTIVENESS OF EXISTING MARICOPA COUNTY REGULATORY ENFORCEMENT PROGRAMS

THIS MEASURE APPLIES TO THE
FOLLOWING POLLUTANTS:
VOCs, PM₁₀

Background and Description of Measure

This measure will enhance Maricopa County's existing enforcement point source regulatory programs through training, technical assistance, compliance assistance courses, and review and revision of existing departmental enforcement and settlement policies.

Implementation Mechanism

1. Maricopa County will accelerate its existing training program for air quality investigators and continue to develop additional industrial process specific training and standard operating procedures.
2. Technical assistance will be offered through the Small Business Assistance Office. Enhancements include the development of additional industry specific guidelines, additional permit application assistance, pollution prevention reviews, and additional referrals for services not offered by the County (e.g., small business loans, ADEQ, Maricopa County Community College District).
3. Maricopa County will work with the Community College District and Arizona Association of Industries to develop compliance assistance courses to offer to interested parties and/or incorporate into the enforcement program. The County will explore the possibility of requiring attendance at these courses as an alternative or supplement to penalties and fines for some violations.
4. Maricopa County will expand the use of Orders of Abatement for resolving certain violations. This will provide an alternative to fines or penalties for specified violations, allow for more speedy resolution of enforcement actions, and allow more cost effective use of limited enforcement resources.
5. Maricopa County will emphasize Environmental Community Action Projects to supplement or supplant fines or penalties in violation settlement proceedings. Cities and environmental organizations will be contacted to solicit ideas for projects.
6. Certain legal issues may be raised by this proposal that require additional analysis.

Period Required for Implementation

1. Schedule and complete staff training within 90 to 180 days. Continue ongoing activities to develop industrial process specific training and standard operating procedures. Upcoming projects include Rule 310 Open Fugitive Dust Sources and Stage I Vapor Recovery.

2. The development of industry guidelines take approximately four to six months utilizing existing staff resources. The referral program will include locating additional services and consistently advising clients of referral availability. The additional permit application assistance, compliance assistance, and pollution prevention reviews will require additional manpower which would be considered by the Maricopa County Board of Supervisors in the next budget cycle for fiscal year 1998 beginning July 1, 1997.
3. The development of compliance assistance courses and partially underwriting presentation of the courses would require a budgetary allocation from the Board of Supervisors leading to a nine months to one year implementation phase.
4. Enforcement policy revisions will require at least 90 days.
5. Emphasizing Environmental Community Action Projects in violation settlement proceedings is in the process of being implemented.

Barriers to Implementation

Improvements that need additional resources will be subject to the annual budgetary cycle for funding. There are unresolved legal issues that require additional analysis.

Effectiveness of Measure

Improvements to the enforcement program resulting in consistent equitable application of rules and regulations will improve compliance rates. In addition, improvements to the small business compliance assistance program and the development of compliance assistance courses will provide education and awareness for affected sources. These activities decrease emissions by reducing and preventing recurring noncompliance.

For example, the addition of a full-time employee (FTE) for the Small Business Assistance Program results in an estimated emissions reduction of 37 tons per year based on the following assumptions: One FTE assists 150 businesses per year; average annual emissions for each business totals 10,000 pounds (5 tons); average emissions reduction per business is 5% based on implementing pollution prevention measures and complying with applicable air quality regulations; and of the total emissions reduction, 70% are VOC reductions and 30% are PM₁₀ reductions. CO emission reductions from stationary sources are insignificant.

Calculation: $150 \times 10,000 \times 5\% \div 2,000 = 37.5$ tons per year (\$1,200 per ton)
 37.5 tons per year $\times 70\% = 26.25$ tons per year VOC (\$840 per ton)
 37.5 tons per year $\times 30\% = 11.25$ tons per year PM₁₀ (\$360 per ton)

Accuracy of Effectiveness Determination

Effectiveness determination is relatively accurate based on Maricopa County inspection, emissions inventory, and Small Business Assistance records that confirm sources operating in compliance and performing pollution prevention techniques have lower emissions than sources operating out of compliance. Actual emission reductions are expected to be greater because the above estimate does not include additional reductions due

to the expanded use of Orders of Abatement, community college courses, and Environmental Community Action Projects.

Cost of Measure

Existing staff can continue to develop policies and standard operating procedures. Maricopa County will be working with the Community College District regarding costs for compliance assistance training to present during the next budget cycle. One additional FTE and supplies for the Small Business Assistance Program will cost approximately \$45,000.

Affected Parties

- # Maricopa County
- # Community College District
- # Arizona Association of Industries
- # Regulated businesses
- # Governments
- # Public

MORE STRINGENT STANDARDS FOR SOLVENT CLEANING

THIS MEASURE APPLIES TO THE
FOLLOWING POLLUTANTS:
VOCs, HAPs

Background and Description of Measure

Solvent degreasing (or solvent cleaning) is the physical process of using organic solvents to remove grease, fats, oil, wax, or solids from metal, glass, or plastic items. VOCs are emitted from the use of nonaqueous solvents (i.e., petroleum distillates, chlorinated hydrocarbons, ketones, and alcohols) during this process. In order to reduce VOC emissions from these processes, Maricopa County has implemented regulatory requirements for solvent cleaning operations. However, emissions from this process continue to be significant. They are currently estimated at 12.5 TPD and approximately 3% of the total VOC emissions in Maricopa County, and 8% of emissions for all area sources. One method of reducing emissions from this activity is for the County to adopt regulations requiring the use of low vapor pressure organic solvents, reformulated lower VOC content solvents, or low VOC aqueous material substitutes. It is anticipated that this measure will reduce VOC emissions from solvent cleaning operations by 5.0 TPD.

Implementation Mechanism

Maricopa County will conduct a formal rule revision process which will include researching the types of cleaning solvents currently in use, identifying specialty cleaning operations and addressing their concerns through workshops and public hearings.

Period Required for Implementation

A formal rule revision process will require approximately nine months to a year to complete.

Barriers to Implementation

Statutory provisions governing the County's rulemaking authority may present an initial barrier to implementation. In most circumstances, the County is required to be consistent with or equivalent to State requirements and regulations. Material specifications for solvents are not included in EPA's existing solvent cleaning control techniques guidance document (CTG) and EPA did not develop a CTG for cleanup solvents (only an alternative control technology guidance document). As a result, a presumptive reasonably available control technology (RACT) identifying material specifications for cleaning solvents has not been established. Maricopa County will have to complete a demonstration that material specifications for solvent cleaning would constitute RACT for these sources during the research and drafting phase of rule development.

According to ARS '49-112 and 49-479, the County may promulgate regulations that are more stringent than otherwise applicable State or federal requirements only if the following conditions are met:

- # The rule, ordinance, or other regulation is necessary to address a peculiar local condition
- # There is credible evidence that the rule, ordinance, or other regulation is either:
 - Necessary to prevent a significant threat to public health or the environment that results from a peculiar local condition and is technically and economically feasible
 - Required under a federal statute or regulation, or authorized pursuant to an intergovernmental agreement with the federal government to enforce federal statutes or regulations in the county rule, ordinance, or other regulation equivalent to federal statutes or regulations
- # Any fee or tax adopted under the rule, ordinance or other regulation will not exceed the reasonable costs of the county to issue and administer that permit or plan approval program.

Maricopa County is currently faced with the potential redesignation of the ozone nonattainment area from moderate to serious classification. Use of organic solvent cleaning materials contributes to the formation of ozone. Significant emission reductions can be achieved by controlling solvent cleaning emissions. On this basis, Maricopa County should be able to justify promulgating requirements that are more stringent than the minimal federal or State requirements.

Effectiveness of Measure

The 1993 periodic emission inventory includes approximately 12.5 tons VOC per day or 3775 tons VOC per year from degreasing and cleaning solvent use. SCAQMD estimates that these emissions may be reduced by 40% for cleaning solvent use and 65% for degreasing solvent use. Applying the 40% assumption of effectiveness to the 1993 calculations results in estimated reductions of 5.0 tons of VOCs per day. Greater than 80% of emissions in this category come from cleaning solvent use in Maricopa County.

Accuracy of Effectiveness Determination

There are uncertainties associated with the determination of effectiveness. The uncertainties result from lack of knowledge as to the types of cleaning processes and the frequency of use found in Maricopa County which may need exemptions and/or individual limits. Another uncertainty arises in that a number of industries have been implementing pollution prevention plans over the last several years and may have already made these process changes.

Cost of Measure

Estimates of cost effectiveness from SCAQMD for a similar rule range from \$100 per ton VOC reduced for degreasing to reduced cost for cleaning solvents. These amounts have been questioned by representatives of certain affected industries. However, many of the objections voiced by industry representatives as to cost effectiveness can be addressed by adoption of a somewhat more flexible rule than that being implemented in southern California.

Affected Parties

# Maricopa County	# Vendors	# Users of cleaning solvents
December 2, 1996		Air Quality Strategies Task Force Report Recommended Control Measures

EXPANDED ENFORCEMENT OF STAGE II VAPOR RECOVERY REQUIREMENTS

THIS MEASURE APPLIES TO THE
FOLLOWING POLLUTANTS:
VOCs, HAPs

Background and Description of Measure

The Stage II Vapor Recovery Program is implemented under ARS ' 41-2132. For Maricopa County, the program requires that most owners or operators of gasoline dispensing sites utilize a stage II vapor collection system for the transfer of gasoline into motor vehicle tanks. A stage II vapor collection system is defined as a system where at least 90% by weight of the gasoline vapors that are displaced or drawn from a vehicle fuel tank during refueling are transferred to a vapor-tight holding system or vapor control system. The purpose of the program is to lower the VOC emissions to the atmosphere during vehicle fueling operations.

In order to ensure that the equipment is functioning properly, the following requirements must be met by the owners or operators:

- # Provide adequate training and written instructions to the operator of the gasoline dispensing site and the gasoline transport vehicle
- # Replace, repair, or modify any worn or ineffective component or design element to ensure the vapor-tight integrity and efficiency of the vapor collection system
- # Connect and ensure proper operation of the vapor collection system whenever gasoline is being loaded, unloaded, or dispensed

The purpose of this proposed measure is to enhance the Stage II Vapor Recovery Program with the following:

- # A requirement that every stage II vapor recovery system undergo a comprehensive testing procedure at least once every year
- # A requirements that the ADWM conduct an annual unannounced follow-up visual inspection at every site at least once every year
- # A requirement that ADWM systematically track and categorize types and rates of noncompliance uncovered by both testing and visual inspection

While it is the goal of ADWM to test every site once a year, every site is usually only tested once every 18 months. ADWM routinely uncovers evidence of recent improvements and repairs made to systems during the annual announced system test.

ADWM currently requires a follow-up retest and \$300 retest fee for sites that fail the annual testing procedure. All retests are announced and generally completed within one month of the initial test. It is estimated that 20% of the sites require a retest.

This measure would likely cause more frequent and earlier improvements and repairs to a larger number of systems. In addition, improved tracking would enable ADWM to target future improvements to the program.

Implementation Mechanism

ADWM would implement the measure by integrating the additional inspections into its current compliance program. Funding source would be a General Fund appropriation.

Period Required for Implementation

Approximately six months to one year because rulemaking is needed.

Barriers to Implementation

The measure would need rulemaking and additional funding.

Effectiveness of Measure

The addition of an unannounced visual inspections conducted once per year would reduce the number of systems operating at less than optimum efficiency throughout the year.

According to ADWM officials, every regulated site is comprehensively tested at an estimated rate of once every 18 months. This measure would provide that every site undergo a scheduled comprehensive test every 12 months and a random unannounced visual inspection every 12 months. If the inspection were to be conducted within six months of the test, and if the two types of procedures uncovered the same types of noncompliance, there would be a reduction in noncompliance by up to 67%. However, the visual inspections would not uncover all of the noncompliance situations that the comprehensive testing would uncover. Visual inspections would manifest the following:

- # Malfunctioning shutoff valves in booted systems
- # Wear and tear on boots
- # Degree of tightness of nozzle spout and malfunctioning vacuum assist in the vacuum assist systems
- # On both systems whether the hoses are in good working condition (e.g., no crimps)

According to ADWM, it is unknown what percentage of noncompliance situations would be uncovered by visual inspections. Therefore, the level of emission reductions at noncomplying sites would be <67% or

$$\frac{18 \text{ months} - 6 \text{ months}}{18 \text{ months}}$$

Accuracy of Effectiveness Determination

The degree of accuracy could be improved if ADWM would begin to systematically track and categorize types and rates of noncompliance uncovered by the annual comprehensive testing procedure and compare those types of noncompliance to those types potentially uncovered by visual testing. Implementing this measure would activate these functions, making future evaluations of program effectiveness more accurate.

Cost of Measure

ADWM would need to add two field compliance officers at Grade 15 and two additional vehicles for an approximate annual cost of \$60,000 and a one-time capital expenditure of approximately \$40,000. As noted previously, funding source would be from the General Fund.

Affected Parties

- # ADWM
- # ADEQ
- # Maricopa County
- # Service station operators

PERMIT AMNESTY PROGRAM

THIS MEASURE APPLIES TO THE
FOLLOWING POLLUTANTS:
VOCs, PM₁₀, CO, HAPs

Background and Description of Measure

In order to adequately regulate emissions from polluting facilities in Maricopa County, those facilities must be identified and must become part of the air quality operating permitting program. The County has reason to believe that there are a significant number of facilities that should have permits but do not. Lack of knowledge of the permitting process and fear of punishment for failure to obtain a permit are two reasons that many facilities have not obtained permits. A measure that has proven effective in other jurisdictions to increase participation in the permit process is a limited amnesty program. Therefore, this Task Force recommends that a Permit Amnesty Program be adopted by Maricopa County for facilities that have emissions of no more than 50 tons per year of any nonattainment-related criteria pollutant (CO, VOCs, PM₁₀). This program is expected to increase compliance with County rules while providing industry with a one-time opportunity to obtain a permit without penalty.

Implementation Mechanism

Businesses can participate by calling the Maricopa County Small Business Environmental Assistant Program (SBEAP) or ADEQ Compliance Assistance Section during the amnesty period. Businesses will be informed of how the program works and their obligations. The business will sign a compliance agreement outlining the steps and timelines for achieving permit compliance. SBEAP and ADEQ will offer free technical assistance and help a business determine whether a permit is necessary. Onsite visits would consist of one County SBEAP staff member. Industry-specific assistance may be provided at community colleges on Saturdays and/or evenings (to a group) to assist specific industry categories with permit compliance. Community college students would be available to survey targeted businesses by telephone and set up appointments as necessary.

Period Required for Implementation

The amnesty period will begin 90 days following amnesty program approval or within three months of initial program development and marketing, whichever is later. The amnesty period will be 120 days. After signing the compliance agreement, the business compliance time frame is limited to 60 days for the permit application submittal unless there are extenuating circumstances. The program is for one time only; however, a two-month extension of the amnesty period may be considered if the response is greater than expected.

Barriers to Implementation

None.

Effectiveness of Measure

This would be determined by the number and type of businesses that come forward. The level of participation is likely to depend on the degree to which stakeholders such as industry associations, chambers of commerce, and cities cooperate and work with the County and ADEQ to promote the program. The track record in other jurisdictions is such that the potential for success is significant.

Accuracy of Effectiveness Determination

Not applicable.

Cost of Measure

A minimum of two FTE will be required to administer the program. The cost of these employees will be offset by additional permit fees.

Affected Parties

A business located in Maricopa County that has emissions of 50 tons per year or less of any criteria pollutant and that otherwise meets the Amnesty Program guidelines.

ANALYSIS OF THE FEASIBILITY OF AN INTER-SOURCE EMISSION CREDIT TRADING AND BANKING PROGRAM

THIS MEASURE APPLIES TO THE
FOLLOWING POLLUTANTS:
VOCs, NO_x, CO, PM₁₀

Background and Description of Measure

Market-based emission reduction programs have proven to be cost-effective alternatives to traditional command-and-control pollution control mechanisms. An inter-source banking and trading program can encourage the retirement of existing pollution sources, while encouraging the implementation of more effective and reliable state-of-the-art controls. Sources which voluntarily make reductions in emissions can bank credits, for sale to other companies or to accumulate as offsets for future use. A banking and trading program can also be useful in attracting new industrial development, due to ready access to emissions offsets.

This measure entails a formal evaluation of the viability of the adoption of EPA's Model Open Market Trading Rule or a similar inter-source emission credit trading program for the Maricopa County nonattainment area.

Implementation Mechanism

ADEQ would be responsible for the selection of a qualified contractor to work with Maricopa County and any other appropriate agencies to research and prepare a report on the advantages and disadvantages associated with the implementation of an inter-source emission credit trading program within Maricopa County. To do so, the contractor would be required to examine the inventories of sources of these pollutants, review EPA's rule, and examine other market trading programs in development or use in the United States. Based on the results of the report prepared by the contractor, ADEQ and Maricopa County would initiate public discussions relating to the benefits, costs, and impacts associated with implementation of an emission credit trading program. Depending upon the outcome of those discussions, Maricopa County's rules would need to be revised to reflect the new trading program, utilizing a facilitated rulemaking, to provide stakeholder involvement.

Period Required for Implementation

A contractor could be chosen within approximately three months after funding is received.

ADEQ estimates that research and the development of a draft report would take approximately four months, followed by two months of stakeholder discussions on the draft report. If those discussions lead to a conclusion that a market trading rule would be desirable, approximately three to four months would be needed for drafting straw man rules. This would be followed by approximately three months for facilitated rulemaking, with one month for final revisions prior to proposing a rule. The total time to develop a proposed rule is estimated at 14 months.

Barriers to Implementation

- # Funding for the preparation of the report by a qualified contractor
- # Personnel time required to present information to the public regarding the applicability of an inter-source emission credit trading program in Maricopa County

Effectiveness of Measure

Because the outcome of this measure is unknown at this time, its effectiveness cannot be projected. According to the EPA, the open market trading program offers states and industry an innovative compliance option for meeting the requirements of the CAA for ground-level ozone in the most cost-effective manner possible. A coalition of northeastern states are considering the use of market trading to address regional ozone reductions. Market trading has been successfully implemented by EPA under the Acid Rain Program, prescribed by Title IV of the CAA.

Accuracy of Effectiveness Determination

Unknown.

Cost of Measure

Costs associated with the consideration of an inter-source emission credit and banking trading program would include the costs to hire a contractor to conduct research on the applicability of the inter-source emission credit program to the Maricopa County area. Additional costs include agency personnel time required to evaluate, present information, and receive comments regarding inter-source emission credit trading program evaluation study. The estimated cost for a contractor is \$150,000 for the necessary research and report preparation. Implementation of this measure will require a General Fund appropriation. If the program was implemented, additional costs would be incurred for staffing and administration of the program. It is also possible that the program could be privatized like the Acid Rain Program, which is currently traded on the Chicago Board of Trade.

Affected Parties

- # Maricopa County Environmental Services Department (MCESD)
- # Maricopa County Association of Governments
- # ADEQ
- # Members of the regulated community located within Maricopa County with an interest in market trading

MORE EFFECTIVE CONTROL OF AREA SOURCE POLLUTION

The term **area sources** refers to a widely diverse group of relatively small facilities and types of activities which emit air pollution as fugitive emissions or from diffuse sources. Very small businesses, construction sites, fireplaces, unpaved parking lots, and use of consumer products are all examples of area sources. While an individual area source may be small in size, their total number can make them significant contributors to air pollution problems.

The Task Force recommends the five measures presented on the following pages to more effectively reduce emissions from these sources.

- # Strengthen Existing Fugitive Dust Controls
- # Expanded Pollution Prevention Program for Area Sources
- # Restrictions on the Construction of New Fireplaces and Tax Incentives for the Upgrade of Existing Fireplaces
- # Measures to Decrease Fugitive Dust Emissions from Agricultural Practices
- # Encourage the Voluntary Use of Temporary Power at Home Construction Sites

STRENGTHEN EXISTING FUGITIVE DUST CONTROLS

THIS MEASURE APPLIES TO THE
FOLLOWING POLLUTANTS:
PM₁₀

Background and Description of Measure

This measure includes a review and strengthening of the implementation and enforcement of Maricopa County existing Rule 310, and an evaluation of the need for other controls to reduce fugitive particulate emissions.

As a moderate PM₁₀ Nonattainment Area, the Maricopa Planning area faced a deadline of December 31, 1994 to demonstrate attainment of the PM₁₀ NAAQS. However, the State demonstrated to EPA that it is impracticable for this nonattainment area to attain the PM₁₀ NAAQS by the specified deadline. As a result, by operation of law, EPA reclassified the area as serious effective June 1996.

The final revision of the Maricopa County PM₁₀ SIP, dated February 1994, concluded that both the annual and 24-hour PM₁₀ NAAQS would continue to be exceeded despite the implementation of all reasonably available control measures (RACM). A modeling demonstration attainment was performed for the annual, but not for the 24-hour NAAQS.

In order to deal with the specific causes and the necessary controls to prevent future 24-hour exceedances, a microscale field study for the Maricopa County PM₁₀ Nonattainment Area was designed in 1994 and conducted throughout 1995.

In May 1996, the Court of Appeals for the Ninth Circuit found that the Phoenix moderate area PM₁₀ plan failed to address the 24-hour PM₁₀ standard as required by the CAA. As a result, the Court mandated that EPA require the State to submit a separate demonstration of implementation of all reasonably available control measures targeting the 24-hour violations, attainment and reasonable further progress for the 24-hour standard. In order to satisfy the court's order, EPA and ADEQ agreed that the State will make an early plan submittal by April 18, 1997 of a microscale plan, based on the results of the microscale study. That plan will address the 24-hour violations at specific monitors and must meet all requirements set out in the CAA, including BACM, RACM, and other measures as necessary to provide expeditious attainment at those monitors. In addition, measures adopted under the microscale plan will need to be adopted and implemented for the Maricopa County nonattainment area.

Preliminary modeling and data review of the 24-hour PM₁₀ NAAQS violations recorded in 1995 in the Maricopa County PM₁₀ Nonattainment Area indicate that local fugitive PM₁₀ emissions are the predominant cause of high PM₁₀ levels recorded in Maricopa County. Maricopa County's Rule 310 is applicable to these fugitive emissions and it is expected that strengthening the enforcement of Rule 310 will be the logical first step in the consideration of potential control measures. Thus, the applicability and development of improved enforcement methods for Rule 310 will be investigated for each significant emission source contributing to the 24-hour PM₁₀ NAAQS violations.

Implementation Mechanism

To a large extent, the effectiveness of Rule 310 is dependent upon its implementation and enforcement efficiencies. Improvements in communications, tracking, data collection, and follow-up can increase its effectiveness, while maintaining regulatory flexibility. This measure proposes the following:

1. ADEQ, in conjunction with MCESD, will contract for the following activities:
 - # Conduct a review of the existing methods employed by Maricopa County for implementing Rule 310
 - # Review applicable control methods used in other areas of the United States
 - # Facilitate public meetings to solicit and receive public comments on these issues
 - # Recommend feasible methods for more effective implementation and enforcement of Rule 310, as well as other feasible measures to reduce fugitive PM₁₀ emissions; and prepare a Rule 310 Implementation Handbook for the regulated community
2. MCESD will incorporate recommendations (if necessary) into guidance documents, other programs support materials and, if necessary, Maricopa County Rule 310 through a rule revision process.
3. MCESD will establish ongoing coordination and communications between Maricopa County and cities and towns for implementation of particulate control strategies region wide. Cities and towns also have various ordinances, building codes, and contract provisions designed to reduce dust. MCESD will identify all available regulatory tools and develop a matrix for integrating and apply the tools through establishment of a communications network among agencies. MCESD will establish an ongoing dust control training program to educate appropriate staff from the County, cities, and towns to effect comprehensive dust control enforcement region wide.
4. MCESD, in conjunction with ADEQ, will initiate partnerships with various industrial associations or industrial sectors to develop industry-specific materials and outreach techniques. MCESD will continue to develop guides and brochures for distribution to affected industry, the public, and staff. MCESD will expand the slide presentation providing examples of both effective and ineffective fugitive dust control techniques.

Period Required for Implementation

- # Mechanism 1 (see above) will begin in mid-November 1996 and be completed by March 10, 1997.
- # If necessary, the rule revision process presented in Mechanism 2 will require approximately four to six months beginning in March 1997. Revisions to Rule 310 will be based in full or in part upon ADEQ contractor recommendations.
- # Mechanism 3 will require perhaps four to six months beginning in mid-November for cities, towns, and County to agree, integrate programs, develop communications, and train staff. Some elements may take longer if any rule revisions, ordinance amendment, or Memorandum of Understanding become necessary.
- # Mechanism 4 will begin over the next four to six months and will be coordinated in part with ADEQ contractor for development of a Rule 310 Implementation Handbook.

Barriers to Implementation

Implementing recommendations to revise Rule 310 will require a formal County rule revision process.

Effectiveness of Measure

Estimates of effectiveness will be developed by the ADEQ contractor. Additional estimates may also be developed during the preparation of the Serious Area PM₁₀ Plan coordinated by MAG. It is anticipated that implementation and enforcement of Rule 310 could be improved sufficiently to demonstrate attainment of the 24-hour PM₁₀ NAAQS.

Accuracy of Effectiveness Determination

The uncertainties associated with the determination of effectiveness will be developed by ADEQ's contractor.

Cost of Measure

This contract and related work have already been budgeted by ADEQ. The cost of the ADEQ contract is currently proprietary because it is in the procurement process. Implementation of contractor recommendations would not require additional resources because it would involve a shift in current resources of MCESD and ADEQ. Affected sources will face higher costs for enhanced fugitive dust controls.

Affected Parties

# Maricopa County	# Public
# ADEQ	# Cities
# Sources of fugitive emissions	# Towns

EXPANDED POLLUTION PREVENTION PROGRAM FOR AREA SOURCES

THIS MEASURE APPLIES TO THE
FOLLOWING POLLUTANTS:
VOCs, HAPs

Background and Description of Measure

This measure will expand the existing Arizona Partnership for Pollution Prevention (the Partnership) and Arizona Material Exchange to target emissions of VOCs which contribute to ozone formation and other air emissions, including HAP emissions and those from area sources.

Implementation Mechanism

MAG estimates that in 1996 the largest sources of VOC emissions were area sources such as service stations, body shops, pesticide applications, architectural coatings, and consumer and commercial solvent use. Area sources emit 36.1% of the VOCs, amounting to almost 92 TPD. Point sources account for another 6.8% of VOCs, totaling almost 19 TPD. This measure would address these sources (except consumer solvent use) through the following:

1. Extend the existing successful partnership (which currently addresses hazardous waste generators, which are mostly point sources) to include area sources by inviting those businesses and their vendors and trade associations to become partners. It is a voluntary, non-regulatory government-industry partnership in which companies establish relationships and exchange information on pollution prevention with each other. Competition, assistance, feedback, and peer role models encourage partners to adopt pollution prevention practices such as substituting lower VOC paints, using aqueous cleaners in place of solvents, and reducing business pesticide usage.
2. Expand the specific goals for minimizing hazardous waste of the partners program to include additional goals to minimize the use and emission of VOCs and other air contaminants. Focusing on air contaminants will encourage Partners to make emission reductions where possible. Partners report results yearly. The results are compiled and distributed to the Partners. Existing Partners reduced their hazardous waste generation by 66%, from 834,037 tons in 1992 to 282,714 tons in 1995.
3. To the existing Partnership teams, add new teams to encourage pollution prevention for area sources of VOCs. Teams could include architectural, paint, printing, auto body shops, etc.
4. Extend the existing material exchange to include the new Partners.
5. Initiate a program for present Partners and model facilities to aid the newly invited Partners to identify and implement source reduction practices for air emissions.
6. Recognize businesses that reduce air emissions.
7. Integrate these efforts with Clean Air Challenge participants and training materials. The Strategic Alliance is another program which could be involved in this effort.

Period Required for Implementation

Numbers 1, 3, 4, and 5 can be initiated within two months. Number 2 will require perhaps four to five months for companies to agree on how to measure successful reductions of VOCs, and for each Partner to set reduction goals. VOC reductions will begin within four months and be measurable after one calendar year of data are available. The program is expected to start slowly, and then build rapidly as word of success spreads. Number 6, recognition, can commence after one year.

Barriers to Implementation

Additional personnel and resources will be required to administer the activities.

Effectiveness of Measure

The Partnership expansion will be effective, based upon the performance of the existing Partnership, which has grown to 63 signed Partners which have reduced hazardous waste generation by 66% between 1992 and 1995. The partners also report cost savings and greater productivity as a result of source reduction success. The effectiveness measurement makes the following assumptions:

- # Area and point sources produce approximately 118 TPD of VOCs (MAG data)
- # Agricultural pesticide and consumer solvent use, not addressed by this measure, are 7.7 TPD
- # 110 TPD are produced by the remaining point and area sources
- # 40% of those source businesses (representing 44 TPD) participate in the Partnership
- # Partners reduce VOC emissions by 7% (3.1 TPD) the first year, from 44 TPD to 40.1 TPD
- # Partners reduce VOC emissions by 20% (8.1 TPD) the second year, from 40.1 TPD to 32.8 TPD
- # Partners reduce VOC emissions by 30% (9.8 TPD) the third year, from 32.8 TPD to 20.9 TPD

Given the above assumptions, this measure would reduce VOC emissions from the current 118 TPD to 96.6 in three years.

Accuracy of Effectiveness Determination

The effectiveness determination will be based upon the number of new Partners establishing VOC or other air pollutant reduction goals, and their subsequent measured reductions. The Partner's reduction measurements accuracy will depend upon the reporting methods used.

Cost of Measure

To ADEQ: One FTE, with appropriate support = \$66,711 maximum. Additional funds will be needed to cover travel, training, publications, contracts, and mailings. The total cost is estimated at \$75,000 maximum for the first year and \$80,000 per year thereafter. This amount would be sought as a General Fund appropriation.

To businesses and trade associations: Time to attend team meetings. Cost of implemented measures will vary, but should be cost effective and have a payback period of less than two years.

Affected Parties

The present Partners are enthusiastic about this approach. Businesses (and their trade associations, vendors, and other related parties) that are subject to regulation for VOC emissions under the air quality statutes and regulations will be invited to participate. Additional businesses that emit air pollutants may also be invited. Participation is voluntary and generally a profitable and successful experience.

RESTRICTIONS ON THE CONSTRUCTION OF NEW FIREPLACES AND TAX INCENTIVES FOR THE UPGRADE OF EXISTING FIREPLACES

THIS MEASURE APPLIES TO THE
FOLLOWING POLLUTANTS:
CO, PM₁₀, HAPs

Background and Description of Measure

According to ADEQ, wood burning can cause up to 40% of the pollution in neighborhoods during temperature inversions. Curbing wood smoke would be especially beneficial to the most sensitive populations: youth; senior citizens; and heart, lung, and cancer patients. These populations spend significantly more time in their homes, which generally are in neighborhoods where wood smoke is emitted.

This measure includes two proposed changes to State law to reduce PM and CO emissions from residential wood combustion. The following two legislative changes are proposed as part of this measure:

- # Require the installation of a clean-burning fireplace installed during new home construction or as an add-on to an existing home
- # Provide an income tax credit to homeowners converting existing residential fireplaces and wood-burning devices to clean-burning fireplaces and wood-burning devices

A discussion of each of these proposed legislative changes is included in the following sections.

Installation of Clean-burning Fireplaces for Newly Constructed Fireplaces

The Task Force recommends the adoption of legislation to require the construction of a clean-burning fireplace and wood-burning devices defined as such by EPA for all newly constructed residential fireplaces. These products would meet EPA Phase II standards⁶ which include certain EPA-certified appliances, natural gas appliances, and fireplaces that have been designated as clean as EPA-certified appliances by a certified air pollution control agency.

Provide a Tax Credit for Conversion of Existing Fireplaces and Wood-burning Devices to Clean-burning Fireplaces and Wood-burning Devices

The Arizona Department of Revenue currently offers a tax incentive for citizens who purchase and install an EPA-certified woodstove, pellet stove, or gas fireplace rather than a conventional wood-burning fireplace. This incentive is a one-time subtraction from gross income of up to \$500. Based on the highest State tax rate

⁶ New Source Performance Standards, 40 Code of Federal Regulations, Part 60, Subpart AAA

of 5.6%, the actual value of this incentive is only \$28. There currently is little publicity regarding availability of the existing tax subtraction.

This measure proposes to provide an income tax credit of up to \$500 for citizens converting existing fireplaces and wood-burning devices to clean-burning fireplaces and wood-burning devices. The credit would be based on the cost of the device, exclusive of taxes, interest, and other finance charges. The device would be required to be permanently installed. In addition, the legislation would repeal the existing subtraction from income for installation of these devices. This will provide an additional incentive for individuals to reduce wood-burning emissions.

Implementation Mechanism

Both of the proposed clean-burning fireplace programs would require legislation. The proposed method for incorporating this measure is provided below:

- # The program to require the installation of clean-burning fireplaces in new home construction or as an add-on to an existing home would require amendments to either Titles 9 and 11, Arizona Revised Statutes, or Title 49, Chapter 3, Article 3 (see note below).
- # The program to implement a tax credit for the conversion to clean-burning fireplaces and wood-burning devices would require amendments to ARS ' 43-1027.

NOTE: The Arizona Homebuilders Association has indicated that they are currently drafting language for a legislative bill for clean-burning fireplaces to amend ARS Title 49, Chapter 3, Article 1; however, by amending Titles 9 and 11 to authorize cities and Maricopa County to adopt identical ordinances, implementation could occur at the local level.

Period Required for Implementation

Implementation of the tax credit could occur in taxable year 1997. Fireplace dealers and distributors are already promoting products that are EPA-approved.

Barriers to Implementation

The purpose of this measure is to limit wood-burning to clean-burning fireplaces and wood stoves as described above. The Hearth Products Industry, woodwax firelog industry, and wood products suppliers have indicated opposition to this measure.

The success of the tax credit program will depend on the degree to which citizens are aware of the tax credit. The tax credit will reduce State tax revenue.

Effectiveness of Measure

According to information contained in the 1990 and 1993 Periodic CO Emission Inventory by Maricopa County, there were 472,170 and 508,204 fireplaces within Maricopa County for the years 1990 and 1993, respectively. This equates to an installation rate of approximately 12,000 new fireplaces in Maricopa County per year.

The CO emission factor for residential fireplaces is 122.2 pounds CO per ton of wood fuel (EPA September 1985). Since the amount of wood burned in fireplaces is estimated to be 184,519 tons annually, the total tons of CO from fireplaces is 11,274 tons or 7.2% of the total CO generated in Maricopa County.

Based on a study conducted by Sheldon Research and RADCO Labs, conventional fireplaces emit an average of 256 grams per hour of CO and 47 grams per hour of particulates. The EPA Phase II standards for Wood Heaters in 40 CFR 60 Subpart AAA establishes maximum thresholds for emissions to qualify as a clean burning appliance.

In July 1990, EPA's Phase II regulations became effective. These regulations required that all appliances manufactured and ultimately sold in the United States be EPA-certified and meet the following standards of performance:

- # 4.1 grams per hour of particulate emissions for catalytic appliances
- # 7.5 grams per hour of particulate emissions for non-catalytic appliances

Accuracy of Effectiveness Determination

- # Replacement of an existing conventional fireplace or wood-burning stove with an EPA-approved device would reduce particulate emissions from that device by 91%.
- # MAG currently has a contractor researching the number of fireplaces located within Maricopa County. Based on the results of the research, the number of fireplaces and the associated new fireplace installation rate may be revised.

Cost of Measure

The requirement for new fireplaces to be clean-burning would require no new tax dollars to be appropriated by the State, county, or cities. Cost to the consumer varies from \$50.00 to over \$1,000.00 depending on the product selected. However, operating efficiencies and material costs may actually result in significant overall customer savings plus significant air quality enhancements.

Costs of the tax credit measure essentially would be the difference between the costs of the current tax subtraction and a proposed tax credit program. However, tax benefits would not apply to newly constructed EPA-approved devices. Assuming the tax credit becomes effective for taxable year 1997, cost to the State General Fund would be \$1.1 million in fiscal year 1998 and \$1.8 million in fiscal year 1999, according to the Joint Legislative Budget Committee (JLBC) staff. Assuming more public awareness of the tax credit program, JLBC estimates about 1 % of an estimated existing 375,000 traditional wood-burning fireplaces Statewide

would be converted the first year and 1.5% the second year. The conversion rate generally agrees with a similar program implemented in Idaho.

Affected Parties

- # Homeowners
- # Home builders
- # Wood-burning device distributors
- # Maricopa County
- # Cities
- # Towns

MEASURES TO DECREASE FUGITIVE DUST EMISSIONS FROM AGRICULTURAL PRACTICES

THIS MEASURE APPLIES TO THE
FOLLOWING POLLUTANTS:
PM₁₀

Background and Description of Measure

Because soil is necessary for crop growth, controlling wind erosion of topsoil is a priority for farmers. For that reason, agriculture continues to improve its management of PM emissions from dust. Fugitive dust from agricultural practices can contribute to localized air quality problems.

Agriculture already has many practices in place to control dust. Farmers should continue to use the following practices that reduce PM:

- # Use normal irrigation practices
- # Use cultivation practices that leave large clods or crop residue on the surface to trap smaller wind blown particles in fallow fields
- # Water surface roads on dairies and feed lots
- # Minimize the number of fallow acres
- # Agricultural interests continue to participate with the Natural Resource Conservation Service (NRCS) and coordinate with MCESD, ADEQ, ADOT, and MAG to further develop, implement, and document the implementation of management practices that reduce dust emissions from agricultural activities

Additionally, the Department of Water Resources should pursue proposals that encourage the planting of fallow acres in the Maricopa PM₁₀ Nonattainment Area.

With the continued urbanization of the Maricopa County PM₁₀ Nonattainment Area, agricultural land becomes less of a source of fugitive PM₁₀ emissions. MCESD estimates that the amount of agricultural land in production declines by 3.3% annually.

To further reduce PM emissions from agricultural practices, the Task Force recommends the following actions:

1. Development, implementation, and documentation of specific voluntary practices to reduce dust emissions from agricultural practices
2. Rule revision to allow the burial of whole stalks during plow-down

These two actions are described further below as Submeasures 1 and 2.

SUBMEASURE #1 - Agricultural Practices to Reduce Particulate Matter Emissions

This measure includes the methods of four agricultural practices by which PM emissions may be reduced:

A) Cover Crops - planting alternative crops during fallow periods:

The U.S. EPA A Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures, (1992), indicates that natural vegetative cover is the most effective and economical method to control wind erosion. The guidance further estimated that these methods could remove from five to 99% of the direct wind force from the soil surface.

Non-irrigated fields would retain existing annual cover or be allowed to establish and maintain cover. Tillage for noxious weed control would be avoided until adequate soil moisture is present to allow stable aggregates or clods to form to prevent leaving soil in a dry, pulverized condition. Mowing to control vegetation and weed heights may be used to meet local weed control ordinances.

- B) Row Orientation - planting crops across the prevailing wind direction
- C) Windbreaks - planting trees or grass perpendicular to the prevailing wind
- D) Vegetation Establishment - conversion of crops to grassland or trees on land not suitable for continuous cropping

Implementation Mechanism

Initial implementation will be voluntary. This submeasure may become part of a list of mandatory agricultural BACM-developed through the coordination of NRCS, MCESD, ADEQ, ADOT, and MAG and implemented through resource conservation plans under NRCS. Any implementation scheme should have an adequate record keeping and tracking component.

Maricopa County will oversee the data collection and tracking component of the measure through its Reasonable Further Progress responsibilities. Existing tracking mechanisms will be used wherever possible. If a data gap exists, ADEQ and Maricopa County will work with stakeholders to identify mechanisms to fill that gap.

Period Required for Implementation

A coordination plan could be started immediately. Implementation would require cooperation with the agricultural community.

Barriers to Implementation

The barriers to implementation of each of the agricultural practices are presented below:

- A) Planting alternative crops during fallow periods

Crop life-cycle. The fallow period may not be enough time for establishment of the most suitable cover crop.

- # Cost to the farmers for water and maintenance until cover is established.
- # Cannot be used in urban areas due to fire code restrictions.

B) Planting crops across the prevailing wind direction

- # Irrigation systems already established may not allow for changing orientation of rows.
- # Landowners may not be able to afford potentially changing irrigation patterns.

C) Planting trees or grass perpendicular to the prevailing wind

- # Irrigation systems already established may preclude the ability to plant wind break vegetation.
- # Landowners may not be able to afford costs of managing and watering non-economic vegetation.
- # There may not be enough soil moisture to support trees or shrubs.

D) Conversion of crops to grassland or trees on land not suitable for continuous cropping

- # Landowners may not be able to afford costs of managing and watering non-economic vegetation.
- # Measure may also be problematic in urban areas due to fire and zoning code prohibitions on flammable vegetative buildups.

Effectiveness of Measure

The data collection and tracking requirement included in the measure will provide a base for determining the effectiveness.

Accuracy of Effectiveness Determination

Not applicable.

Cost of Measure

The following costs may be associated with each BACM:

A) Planting alternative crops during fallow periods

Sierra Research, Inc.⁷ indicates the costs for fallow field treatment of \$496,900 per ton PM reduced. The cost of fallow field treatment calculated by Sierra Research includes the cost for cover crops or grass revegetation of irrigated fields, maintenance of crop residues on non-irrigated fields, and mowing for weed control.

⁷ Particulate Control Measure Feasibility Study, Volume I, Sierra Research, Inc. (September 24, 1996).

B) Planting crops across the prevailing wind direction

Crop row orientation may be determined by existing irrigation networks. To yield an air quality benefit, the measure would require a change in the irrigation system orientation. Due to the uncertainties in the number of facilities that may implement this control measure, a cost has not been developed for the implementation of this control measure.

C) Planting trees or grass perpendicular to the prevailing wind

- # Cost of planting trees, assuming no other changes needed to the irrigation system.
- # Cost could be incurred if site preparation to be performed will depend on the need to eliminate all competitive growth. This is usually accomplished by discing or other methods.
- # Cost will be incurred in delivering water as required, particularly during the first year of establishment.
- # Sierra Research, Inc. indicates a cost of \$242,860 per ton PM reduced for the construction of windbreaks. This cost is based on the construction of a wind break consisting of two rows of trees along the upwind edge of a square parcel with an area of one acre. The cost analysis assumed the use of fast-growing 5-gallon trees, costing \$35 each.

D) Conversion of crops to grassland or trees on land not suitable for continuous cropping

- # Cost could be incurred if site preparation to be performed will depend on the need to eliminate all competitive growth. This is usually accomplished by discing or other methods.
- # Cost will be incurred in delivering water as required, particularly during the first year of establishment.
- # Sierra Resources, Inc. calculated the cost of revegetation associated with a requirement for a dust mitigation plan for vacant parcels greater than 10 acres in size. The cost estimated for revegetation and the submittal of a dust control plan was \$212,500 per ton of PM reduction. The cost calculated by Sierra Research included a cost of \$2500 for development of a dust control plan and a cost of \$304 for dust control plan review and enforcement. These costs would not be applicable for this control measure. Sierra Research indicated a cost of \$1900 per acre for revegetation.

The accuracy of these cost estimates may vary greatly, depending on circumstances. According to the South Coast Air Quality Management District⁸, due to the uncertainties in the types of controls that may be implemented as method of reducing particulate emissions from agricultural practices, as well as the number of facilities that may elect to implement voluntary plans, costs associated with agricultural control measures are difficult to calculate and have not been calculated for the South Coast Air Basin.

Affected Parties

- | | |
|----------------------------------|-----------------|
| # Arizona Growers | # ADOT and ADEQ |
| # NRCS | # MCESD and MAG |
| # Farmers | |
| # Agricultural Extension Offices | |

SUBMEASURE #2: Allow for Burial of Whole Stalks During Plow-Down

⁸Draft Appendix I-D, Best Available Control Measures PM₁₀ SIP for the South Coast Air Basin ([South Coast Air Quality Management District] April 1994).

Cotton is a perennial plant that may be cultivated for two or more years without reseeding. Several years ago, State pest management requirements for cotton banned the practice of "stub" cotton cultivation. Arizona Department of Agriculture (ADA) rules include deadlines for cotton plow-down. Plowing down the stalks involves shredding cotton stalks and two or more plowing passes over the field. Research has been conducted to test alternative plow-down techniques that reduced the number of passes, reducing costs and dust emissions required to meet the plow-down requirement. The most successful technique discovered to date for Arizona cultivation and soil conditions is the burial of whole, rather than shredded, stalks. As a result, energy use during plow-down could be reduced by two-thirds (phone communication with Lyle Carter, United States Department of Agriculture [USDA], Agricultural Research Service, Shafter, California).

Proposed revisions to the ADA rules would allow shredding of stalks without requiring plowing-under of the resulting debris, but shredding would still be required. Unfortunately, the shredding process can be the largest source of dust emissions in meeting the plow-down requirement. Further, the proposed rules do not allow burial of whole stalks. Revised rules are expected to be completed and filed with the Secretary of State in November 1996. This measure recommends that ADA provide for the burial of whole stalks during plow-down, if research documents that it is effective at preventing plant disease and pests. Further, some consideration should be given to application of this technique for other crops (e.g., winter wheat), which are burned or plowed under to prepare the field for subsequent crops.

Current research conducted by Lyle Carter, USDA, which focused upon the effects of whole-stalk burial for the last two growing seasons, has not documented any increase in the spread of plant disease or pests. Likewise, research has not documented that shredding of stalks reduces the spread of disease. Research is still inconclusive due to the limited number of trials conducted through only two growing seasons.

Implementation Mechanism

ADA could revise its rules addressing quarantine and plow-down practices for crops to provide for burial of whole stalks.

Period Required for Implementation

Rulemaking will take a minimum of six months.

Barriers to Implementation

There may be a reticence to change a rule that to date has been perceived as preventing the spread of plant disease and pests.

Effectiveness of Measure

Gary Thacker, formerly of the University of Arizona Agricultural Extension Office (UAAEO), estimates that burial of whole stalks would require three or four fewer tills during the growing cycle, yielding at least a 44% reduction in emissions from conventional methods, estimated to be approximately 15.8 pounds per acre of cotton.

Based on the 1993 estimate of 132,200 acres of cotton in Maricopa County, it has been calculated that PM emissions in Maricopa County may be decreased by 1,044 tons per year.⁹

Accuracy of Effectiveness Determination

Extensive research on emissions from cotton plow-down has been conducted by UAAEO under ADEQ sponsorship. These documents are available at ADEQ, and may be reviewed at any time, upon request.

Cost of Measure

New technology can bury whole stalks and can be used on crops in addition to cotton. The cost of the equipment is \$30,000 compared to \$10,000 for conventional plow models. However, because of the fewer number of tills required and lowered energy use, the new technology is comparable in cost. It is possible for the increased cost of this new device to be recovered in one year through savings in fuel costs, labor, and tractor wear and tear.

Affected Parties

- # Cotton growers
- # ADA
- # USDA Agricultural Research Service

⁹ Emission reduction information is not available for agricultural practices in which the whole cotton stalks are buried. Emission reduction information has been utilized for a stalk puller in which the whole cotton stalk is uprooted, baled and removed from the site, without the use of on-site shredding (*Cotton Tillage/Quantification of Particulate Emissions, Final Report: 1991-94 Trials* by Wayne Coates, and *Reduced Tillage Systems for Arizona Cotton Grower* by Wayne Coates and Gary Thacker).

ENCOURAGE THE VOLUNTARY USE OF TEMPORARY POWER AT HOME CONSTRUCTION SITES

THIS MEASURE APPLIES TO THE
FOLLOWING POLLUTANTS:
VOCs, CO, PM₁₀, HAPs

Background and Description of Measure

Power equipment at construction sites could utilize temporary electrical power rather than portable generators, reducing pollution and noise. (Note approximately 30,000 new homes are added per year in the metro area, releasing approximately 1,725 pounds. CO/home, or nearly 26,000 tons/year.) Conversion to temporary power for construction of 1,000 homes from generators to temporary power would reduce 864 tons.

The key features of this measure include:

- # Available in both Arizona Public Service and Salt River Project areas
- # Technology exists today
- # Reduction of PM₁₀, hydrocarbons, CO, and noise
- # Contractors have eliminated a piece of equipment requiring maintenance
- # Elimination of equipment that is often stolen

Implementation Mechanism

Homebuilders can request the installation of temporary power at construction sites by calling their local utility.

Period Required for Implementation

Usually can be installed within 30 days or less, depending upon availability of electrical service in adjacent area or streets.

Barriers to Implementation

Measure is voluntary. Some contractors may have their own portable generators and may wish to continue using them.

Effectiveness of Measure

Cost of temporary power unit and power usage is estimated at less than \$100 per home. For 1,000 homes/year, this would result in reduction of:

- # 864.31 tons CO per year
- # 18.68 tons HC per year
- # 1.27 tons PM₁₀ per year

Accuracy of Effectiveness Determination

Based on calculating usage and emissions from temporary generators and subtracting equivalent emissions from power plants to generator this power.

Cost of Measure

None. Costs to be borne by homebuilders. Overall costs per home estimated to be reduced by 50%.

Affected Parties

- # Utilities
- # Homebuilders
- # Contractors

Since the program is voluntary and is anticipated to reduce costs, little or no negative impacts are expected.

MEASURES TO ENCOURAGE THE USE OF ALTERNATIVE FUEL VEHICLES

With greater market penetration, alternative fuel vehicles can make a significant contribution to reducing air pollution. With the exception of brake and tire wear, electric vehicles emit no pollution in the Nonattainment Area. Conversion of a vehicle from conventional gasoline to compressed natural gas can reduce VOC emissions by 40%, CO emissions by 50%, and NO_x by 20%. Limitations on fueling options and the relatively larger capital cost of these vehicles are existing barriers to more widespread use of alternative fuel vehicles. The Task Force recommends the following two measures to encourage the use of alternative fuel vehicles.

- # Measures to Encourage the Construction and Operation of Fueling Stations for Alternative Fuel Vehicles
- # Extension and Modification of the Existing Alternative Fuel Vehicle Tax Incentive Program

MEASURES TO ENCOURAGE THE CONSTRUCTION AND OPERATION OF FUELING STATIONS FOR ALTERNATIVE FUEL VEHICLES

THIS MEASURE APPLIES TO THE
FOLLOWING POLLUTANTS:
VOCs, NO_x, CO, PM₁₀,
HAPs

Background and Description of Measure

One of the significant impediments to increased use of alternative fuel vehicles is the lack of availability of fueling stations. To address this deficiency, it is recommended that the Arizona Legislature take the following actions to authorize and promote a fueling infrastructure for alternate fuels:

- # A State-wide credit/debit fuel card system should be established for alternate fueling needs for all public/governmental agencies. The private sector system of credit/debit cards is permitted to join in this Statewide alternative fueling network through existing mechanisms
- # The Arizona Department of Commerce should be charged with establishing an Arizona Clean Air Station placard and designation that would be granted, pursuant to a written application, to any public fueling station that certified it offers at least two alternative fuels for retail sale to vehicles as defined in A.R.S. ' 280-385.
- # The State of Arizona and its agencies should incorporate the goals, strategies, and timelines of the Clean Cities Plan adopted by the appropriate metropolitan planning organizations as minimum standards for Area A and Area B.
- # The Arizona Department of Commerce should be authorized to grant funds to metropolitan planning organizations to continue the Clean Cities Plan. Such funding should not exceed \$100,000 in any one fiscal year.
- # The Legislature should provide to any fueling station that receives the ADEQ Arizona Clean Air Station designation and placard, a 1/44 per gallon State use fuel tax abatement/credit for all fuels sold other than alternative fuels as defined in ARS ' 41-1518 and diesel fuel. This abatement/credit should be available to qualifying stations for all fuel sales as limited above at retail in Area A and in Area B. This provision will sunset effective December 31, 2002.

The implementation of the measures described above should provide immediate incentives to build a fueling infrastructure for alternative fuels.

Implementation Mechanism

The Legislature would have to adopt the action items described above. These actions would be subject to necessary additional determinations of the cost and reasonable projections for use fuel fund impacts.

Depending upon the magnitude of the impacts, it may be necessary to appropriate additional funds or charge fees to reimburse affected collections.

Period Required for Implementation

Within two to five years of legislative authorization.

Barriers to Implementation

Designing appropriate funding mechanisms or dedicating specific or general funds to mitigate use fuel fund impacts.

Effectiveness of Measure

According to a 1993 study by ADEQ, each vehicle converted to compressed natural gas in the State fleet experienced a greater than 50% reduction in CO, VOCs, and HAP emissions. The Clean Fleet Vehicle Emissions Statistical Analysis Report #6, June 1996, shows about a 70% decrease in CO emissions compared to a gasoline-powered control group.

Accuracy of Effectiveness Determination

The actual impact of this measure on air quality can be evaluated by measuring the actual gallon equivalents of alternative fuels sold (as currently reported to ADOT) and as a percentage improvement as far as reduced emissions from the State vehicle fleet (public and private) based on current studies by ADEQ as noted above.

Cost of Measure

The amount of appropriation required for this will depend upon the overall scope of the program. In all cases, the development of the alternative fueling sites will require private investment.

Affected Parties

- # Federal government fleets
- # ADOT - State Government Fleets
- # Arizona Department of Commerce
- # Cities/towns and counties
- # School districts
- # Metropolitan planning organizations
- # Private development and fueling companies
- # Arizona Transit Association
- # Citizens who may utilize alternative fuels

EXTENSION AND MODIFICATION OF THE EXISTING ALTERNATIVE FUEL VEHICLE TAX INCENTIVE PROGRAM

THIS MEASURE APPLIES TO THE
FOLLOWING POLLUTANTS:
VOCs, NO_x, CO, PM₁₀,
HAPs

Background and Description of Measure

In order to provide incentives to the alternative fuel vehicle market, the existing fuel tax incentives in ARS ' ' 43-1086 and 43-1174 should be continued through the taxable year 2000. In addition, alternative fuel vehicle incentives should be kept at \$1,000 through tax year 2000 and should be modified to include leased vehicles. The time frame would extend the incentives through the SIP compliance dates and correspond with initial commercial market delivery of alternative fuel vehicles.

Implementation Mechanism

This measure would require minor modification to existing State law.

Period Required for Implementation

In order to achieve full effects of this proposed measure, legislation should be enacted in the 1997 Legislative Session. Implementation could begin upon effective date of measure.

Barriers to Implementation

Requires legislation and would provide a one-time tax credit to lessee for alternative fuel vehicles (which are not currently covered).

(Note this measure still meets the original intent of the existing legislation to promote introduction of alternative fuel vehicles into the market place.)

Effectiveness of Measure

Net emission reductions¹⁰ from electric vehicles are:

Hydrocarbons (HC)
6.6 lbs. HC/month/Car
7,920 lbs/year for 100 cars

CO
54.17 lbs. CO/month/car
65,004 lbs/yr for 100 cars

Assuming a lease of 1,200 electric vehicles for a three-year period, this translates into an effectiveness of \$8,420 per ton of HC and \$1,206 per ton of CO. Impacts of additional alternative fuel vehicle purchases have not been calculated.

Accuracy of Effectiveness Determination

Analysis is based only on electric vehicle emissions. Additional benefits are anticipated for natural gas vehicles.

Cost of Measure

The cost to the General Fund of reduced revenues from the extended and expanded tax credit will depend upon participation in the program.

Affected Parties

- # Alternative fuel vehicle lessees and purchasers
- # Arizona Department of Revenue

¹⁰Assumes 12,500 miles/year and offsets electrical generation emissions. Because of the small numbers involved, emissions reductions were not calculated in tons per day.

MEASURES TO INCREASE PUBLIC, GOVERNMENTAL, AND BUSINESS AWARENESS OF AND PARTICIPATION IN EFFORTS TO REDUCE URBAN AIR POLLUTION

Since the first Clean Air Campaign in 1986, the Maricopa Nonattainment Area has shown strong support for public education on air pollution reduction measures. Each year, that Campaign has documented success in changing motorists' behavior and in promoting less-polluting commuting options. More recently, businesses have been asked to go beyond compliance, and they have responded with voluntary participation in the 1996 Clean Air Challenge.

The Task Force supports expansion of these educational and technology transfer activities, and recommends the six measures presented on the following pages to increase their effectiveness.

- # Enhanced Year-Round Clean Air Campaign
- # Measures to Improve ADEQ's Ability to Predict Elevated Ozone and Carbon Monoxide Levels
- # Remote Sensing Public Information Program
- # Continuation of Clean Air Challenge
- # Measures to Increase the Participation of High Schools in Clean Air Efforts
- # Defer Emissions Associated with Governmental Activities

ENHANCED YEAR-ROUND CLEAN AIR CAMPAIGN

THIS MEASURE APPLIES TO THE
FOLLOWING POLLUTANTS:
VOCs, CO, PM₁₀, HAPs

Background and Description of Measure

An enhanced Clean Air Campaign is recommended as a necessary component in reducing air pollution. The higher level campaign would expand its scope to promote alternative transportation modes including car pooling, vanpooling, riding the bus, bicycling; compressed schedules and telecommuting; and other pollution-reducing measures with messages and information on wood burning, lawn equipment use, time of day driving, and fueling to the general public. The current budget of less than \$200,000 for the whole year is spent in the 6- to 8-week critical CO season to make it as effective as possible.

The bicycle education component would target large employers and their employees, schools, and their students and would work with police departments, city planners, and visitors bureaus. The program would encourage more bicycling and educate on bicycle safety and disseminate information on bicycle facilities and air quality benefits. Employers would continue to be encouraged to put up bike racks for employee and/or P & R lots would be paid by the transit agency or a private sponsorship program could be developed if the demand for such facilities is indicated.

An education component on the air quality benefits of Xeriscape and other desert-type landscaping would be targeted to the public, as well as landscapers and home builders. Biogenic emissions comprise up to 17% of the VOC inventory, some of which can be attributed to types of vegetation that are not indigenous to this area. Indirect benefits would include reductions in CO and particulate pollutants due to the reduction in the use of lawn mowers and trimmers (from less turf), as well as a possible reduction in entrainment of pollens.

The enhanced campaign would build and maintain awareness, increase understanding of many more options and increase participation in more options. From research done after the new summer ozone campaign, it was clear that the more strategies people are made aware of to help clean the air, that they will take action (62% of those aware took action). In addition, respondents who do not use an alternative modes to and from work were much more likely to have participated in other pollution reducing measures e.g., more than twice as many drive alones said they fueled after 4 p.m. than the rest of the population.

This measure would help support the efforts of the 1,300 employers in TRP required to reduce SOV trips to their 500,000 employees and students.

If successful, this would help to change commuters=driving behaviors and employers=perceptions of the benefits of telecommuting and compressed schedules. The measure will require a high-visibility campaign with sustained frequency and a targeted approach to the high potential markets.

A multi-faceted campaign would be launched with television as the main medium to build reach and frequency. This would be supported with radio, newspaper, transit sides/shelters, and billboards. Corporate executives would also be targeted through direct mail, management briefings, and business publications. Camera ready materials would also be provided to employers to distribute to employees. Many organizations including jurisdictions and associations would be contacted to help expand the outreach efforts.

Implementation Mechanism

An enhanced Clean Air Campaign would be implemented by Maricopa County and RPTA. Oversight of the campaign would be provided by private and public sponsors including ADEQ, ADOT, Maricopa County, MAG, RPTA, and Phoenix Chamber and other groups that serve on a Clean Air Working Group including the Arizona Lung Association and corporate members such as Arizona Public Service and Salt River Project.

Involvement and oversight by the following types of groups would continue and be enhanced: CA Clean Air Executive Board of corporate executives, other private and public employers serving on various committees, and an ad hoc government public information officer group.

A campaign plan would be submitted at the beginning of the year and a final report on results filed at the end of the year with the JLBC.

Period Required for Implementation

A year-round campaign, with major emphasis during the CO and particulate pollution months of October through March and high ozone pollution months of June through September.

Barriers to Implementation

Cost of the program.

Effectiveness of Measure

The effectiveness of the summer ozone campaign illustrates the effectiveness of the need for increased funding levels. The summer ozone campaign was a two-month \$400,000 program compared to under \$200,000 for the whole year. The awareness of the ozone campaign was 77% compared to 54% for the previous winter's campaign. The ads were effective in communicating the message, with 75% of those aware of the ads able to (unaided) offer a specific message from the commercial. Also, 62% of those aware said they took some action in response to the campaign.

About half (51%) of the people who drive alone to work or school indicate that they have used an alternate mode in the past four years. Of those, most or 68% indicate they would consider using an alternate mode again. The following assumptions assume that even a small percent of former (or new) users would start using alternate modes again.

It is estimated very conservatively that between 1% and 2% of daily VMT or between 630,000 and 1.265 million VMT per day could be reduced (within a five year time frame). This estimate was based on a study

done by Apogee Research for U.S. Department of Transportation on the potential mode shift of transportation options.

This projection would mean that the following new mode users would participate at the following frequency: Can additional 4,500 to 8,900 new carpoolers 3 days per week; 11,500 to 23,700 telecommuters 2 days per week; 8,500 to 17,000 people on compressed schedules 1.1 days per week; 800 to 1600 new bike riders 2.5 days per week or between 25,300; and 51,200 new participants in alternative modes of transportation or work schedules at least one day a week. A range is provided due to the difficulty in providing accurate projections of future participation levels (the higher figures use the Apogee Research methodology). No calculations have been made for the savings that could accrue for the other pollution reducing measures.

Accuracy of Effectiveness Determination

These estimates of mode shift appear to be feasible but may be overstated since they assume a certain level of participation. Projecting future participation is difficult.

Research indicates that 52% of current drive-alone commuters were former alternate mode users and 68% of them indicated that they would consider using that mode again.

There is a synergy between all alternate modes of transportation and the participation levels of each. The public education and promotion of all modes and other pollution reducing measures need to have the benefit of a longer duration campaign with adequate frequency.

Market researchers that conduct the annual tracking of participation have indicated that over the years, higher levels of participation were achieved in years when the campaign had a higher level of advertising (received from public service advertising).

Cost of Measure

\$1.8 million per year. The Task Force recommends that the program be funded by a new vehicle registration fee as described in the measure described previously and titled Making Vehicle Emissions Programs Self-Supporting.

Affected Parties

- # Employees
- # Student commuters
- # General public

MEASURES TO IMPROVE ADEQ'S ABILITY TO PREDICT ELEVATED OZONE AND CARBON MONOXIDE LEVELS

THIS MEASURE APPLIES TO THE
FOLLOWING POLLUTANTS:
VOCs, CO

Background and Description of Measure

The implementation of a number of programs and voluntary citizen actions are linked to predicted elevated levels of ozone or CO likely to occur within 24 to 36 hours of the prediction. The accuracy of the predictions is, however, constrained by limitations on ADEQ's ability to gather the meteorological data needed for appropriate analysis. Thus, ADEQ has on some occasions been forced to predict the likelihood of elevated ozone concentrations based upon incomplete information. This measure would significantly increase ADEQ's predictive capability by providing the means for the department to obtain accurate and current upper air sounding data. Currently, the only upper air soundings data available for the Phoenix area are the soundings taken at Tucson, Arizona. The availability of upper air sounding data specific to the Phoenix metropolitan area in a timely fashion would improve the ozone and CO forecasts made by ADEQ and would provide funding for the launching of radiosondes (four times daily: 0600, 1000, 1400, and 1800) to collect upper air data for the Phoenix metropolitan area during the ozone and CO seasons (ozone season: May to September; CO season: November to March).

Implementation Mechanism

The cost of implementing the additional meteorological data gathering can be paid as a general fund appropriation, or as the Task Force has recommended, the cost can be covered by an addition to the vehicle license fee.

Period Required for Implementation

After passage, it would take six months to one year to either contract or hire staff and purchase equipment to make the collection of routine upper air soundings data operational.

Barriers to Implementation

- # Federal Aviation Administration must approve site for radiosonde launches.
- # Finding and recruiting staff with the necessary meteorological and field measurement skills required for radiosonde launches.

Effectiveness of Measure

The availability of upper air sounding data for the Phoenix area will allow ADEQ's Air Quality Division's (AQD) meteorologist to make more accurate ozone and CO daily forecasts since actual upper air sounding data will be used in the forecast instead of using interpolated data from Tucson National Weather Service's radiosonde launches. In addition, these data will further the research needed to explain ozone and CO formation and transport in the Phoenix Metropolitan area by providing additional critical data that are necessary to an understanding of what is actually occurring in the atmosphere during and preceding an ozone or CO exceedance.

Accuracy of Effectiveness Determination

Previous upper atmospheric profiles taken by ADEQ in 1992 and in 1995 during ozone field studies, using a tether sonde, have proven to be effective in assisting AQD's meteorologist in making daily ozone forecasts, by identifying inversion layers in the atmosphere which inhibit vertical mixing. Access to this information on a consistent and real time basis can be expected to similarly improve both forecast accuracy and timeliness.

Cost of Measure

Estimated at \$350,500 in the first year.

# One time outlay for radiosonde tracking equipment =	\$100,000
# 4 launches/day x 30 days/month x 10 months x \$180/launch =	\$216,000
# Salary (\$25,000) & benefits (38%) for one staff (EHS I) =	\$34,500

Costs are estimated at \$250,500 in subsequent years. The Task Force recommends that these costs be funded by a new vehicle registration fee as described in the measure described previously and titled **Making Vehicle Emissions Programs Self-Supporting.**

Affected Parties

- # ADEQ
- # National Weather Service
- # Federal Aviation Administration
- # Motorists

REMOTE SENSING PUBLIC INFORMATION PROGRAM

THIS MEASURE APPLIES TO THE
FOLLOWING POLLUTANTS:
VOCs, CO

Background and Description of Measure

This program would utilize remote sensing to inform the public how proper maintenance of their vehicles is a part of the solution to our air pollution problem. An electronic sign would give an instant read out of vehicle emissions to drivers of vehicles passing through remote sensors. This more visual public education program will also provide a new opportunity for the public and the media to participate in mobile emission reduction programs.

The Task Force considered a variety of other enhancements to the Remote Sensing Program, but did not recommend their implementation at this time, based on two considerations. First, the Task Force concluded that remote sensing is too new a program to conclusively demonstrate cost effectiveness. Second, changes in technology may be available in the next 18 to 24 months, which may make the improvements discussed by the Task Force obsolete before they are implemented. For example, permanent, unmanned unobtrusive sites, and the ability to gauge vehicle operating temperature (to avoid falsely failing cold-start vehicles) may become more cost effective in the future.

Implementation Mechanism

The technology exists for this measure but the appropriate and adequate development of the remote sensing sign, its message, the location relative to traffic safety, and other factors are important to the education program's effectiveness and success. This program would include planned media events. The State would bid the work out in order to get the best price and value from potential contractors. A specific public education program will be required to inform motorists that a good remote sensing reading would not assure that the vehicle would pass emissions inspection.

Period Required for Implementation

Once the details of the program have been developed (1 or 2 months) and the electronic sign(s) is (are) fabricated and procured, implementation can be almost immediate.

Barriers to Implementation

The primary barrier to implementation is the acknowledgment and acceptance of the need for further public education as well as the development of a more positive media interest and reporting on all elements of the Arizona IM program.

Additional funding is necessary for implementation of this measure. Certain costs of this program should also come from the Clean Air Campaign.

There is no known legal impediment to the implementation of this program.

Effectiveness of Measure

This measure can enhance the public's personal awareness and perhaps elevate a sense of responsibility relative to cleaning up and maintaining clean air. This effectiveness would not only be measured by the relative acceptance of the remote sensing program, but also the enhanced IM testing procedure (IM 240), the waiver restrictions, etc.

Accuracy of Effectiveness Determination

The actual effectiveness of this measure will be ascertained by the short-term and long-term response of the public and the media to all elements of the Enhanced Vehicle Emissions Inspection Program.

Cost of Measure

This program concept received a very limited initial test in Fresno, California last year by the California Bureau of Automotive Repair. These signs were used for demonstration purposes at media events in most of the major metropolitan areas in California last year. The signs are owned by Bureau of Automotive Repair but were designed and fabricated by a contractor. The signs are billboard type with an indication of POOR, FAIR, and GOOD based on predetermined cut-points. Dr. Donald Stedman, the principal developer of remote sensing, also has a billboard type sign permanently set up in Denver. Input may be obtained from these contractors who have known experience on this type of a project. However, any contract that is secured for this program will have to be competitively bid in order to be consistent with State procurement practices. An Arizona contractor has estimated the cost of each sign at \$10,000. With signs for three sites with paired vans, the estimated total cost of this program is \$30,000. The Task Force recommends that this measure be funded under the new vehicle registration fee described in the measures entitled **AMaking Vehicle Emissions Programs Self-Supporting.**@

The ultimate costs of this public information control measure will depend on the program's design and extent of implementation.

Affected Parties

This program will have the most impact on the public but will require the attention of ADEQ, its remote sensing contractor, county and local officials, traffic safety/enforcement officials and the media.

CONTINUATION OF CLEAN AIR CHALLENGE

THIS MEASURE APPLIES TO THE
FOLLOWING POLLUTANTS:
VOCs, CO, PM₁₀

Background and Description of Measure

This is a voluntary program and is similar to the ABusiness for Clean Air Challenge,@launched this past summer to encourage employers to Ago the extra mile@in helping to reduce ozone pollution. This new employer Clean Air Challenge initiative would help recruit more employers to keep up their extra efforts during the high CO and particulate season this winter.

Employers that sign up will receive recognition for their commitment with their name in an ad to be run in the spring in the Business Journal and several other publications. This program targets CEOs, requesting their necessary management commitment to encourage alternate transportation modes, compressed schedules, telecommuting and other pollution-reducing measures to their employees.

Implementation Mechanism

A letter has been sent (with a package explaining the program) to over 1,200 Valley CEOs inviting them to make the pledge to the new AClean Air Challenge@and was signed by the co-Chairs of the Clean Air Campaign, Mark DeMichele, President and CEO of Arizona Public Service, and Dr. Art Mollen of the Mollen Clinic. Personal appeals will be made to various top level employer groups and committees by the chair and other members of the Clean Air Executive Board.

Period Required for Implementation

The program will be promoted this fall and winter and the summer program will be reissued next summer.

Barriers to Implementation

None.

Effectiveness of Measure

- # During the summer program, 126 employers signed up for this voluntary program. Many innovative strategies were implemented this summer as part of this program including: Cox Communication in coordination with Arizona State University, Del Webb, and MicroAge piloted some new technology for telecommuting; Southwest Airlines shifted some of their use of gasoline-powered tractors to electric; Salt River Project offered customers a rebate on electric lawn mowers and other lawn equipment if they turned in gasoline powered mowers; Arizona Public Service did some product substitution, used temporary power instead of gasoline-powered generators with the Homebuilders Association, and reduced their parking subsidies; and Mobil Oil did public education at their stations.

- # Over 50 employers have already signed up for the wintertime Challenge.
- # It is hoped that this type of voluntary program will encourage more employers to make top level commitments and implement innovative and effective measures during the critical high pollution months, as well as throughout the year. It is difficult to estimate the impact at this time.

Accuracy of Effectiveness Determination

No estimates of past or future savings are available.

Cost of Measure

No cost.

Affected Parties

It is hoped that additional employers would sign up for the winter initiative, and again next summer.

MEASURES TO INCREASE THE PARTICIPATION OF HIGH SCHOOLS IN CLEAN AIR EFFORTS

THIS MEASURE APPLIES TO THE
FOLLOWING POLLUTANTS:
VOCs, NO_x, CO, PM₁₀,
HAPs

Background and Description of Measure

The Task Force believes that the Arizona Department of Education should require high school governing bodies in Maricopa County to publicly consider the feasibility of adopting measures to reduce vehicle travel by faculty and students through such measures as closed campuses at lunch, voluntary or mandatory parking programs and other trip reduction and pollution-reducing activities. The specific measures to be considered should include:

- # Establishment of a closed campus policy for all student drivers, whereby students would not be allowed to drive off campus over the lunch hour (students that have jobs would be exempt).
- # The imposition of parking fees for students on a monthly or quarterly basis. This will require work with local jurisdictions to mitigate any adverse impacts on local residential streets through parking permit programs.
- # A prohibition on driving to school or during the lunch period on High Air Pollution Advisory (HPA) days. Implementation of this measure would require a district to sign up for the RPTA's HPA fax notification program and post or announce the HPA days and closed campus for the next day.

This measure would require high school governing boards to consider a list of possible control measures at public meetings. The schools could receive Acredit@ on their TRP plans under the new flexibility components for that program or the existing TRP guidelines for implementing any of the measure listed above or whatever other measures that were implemented and demonstrated effective.

Implementation Mechanism

An executive order or legislation requiring the State Department of Education and/or ADEQ to notify all school boards or require Maricopa County to notify all school superintendents that they consider these measures for discussion and possible action at a scheduled public meeting of the school board by June 1997.

Maricopa County will be required to send a packet of information to school superintendents (from schools that are required to participate in the TRP) further requiring them to consider and discuss these measures.

Period Required for Implementation

Could take up to two months to send information out and up to one year to implement this measure.

Barriers to Implementation

These measures would not be popular with some students and may be costly for some school districts to implement.

Effectiveness of Measure

These types of measures have been known to be very effective. According to Maricopa County, there are 28 high schools in the TRP program. For example, if all of the 28 high schools adopted a closed campus program, about 16,800 VMT could be eliminated every day or about 2.52 million VMT per school year. This is equivalent to 45 fewer tons of VOC and even higher CO emissions annually.

Accuracy of Effectiveness Determination

The TRP survey or new evaluation techniques for the new TRP flexibility law will more accurately measure the effectiveness of this measure.

Cost of Measure

Recent closings of two high school campuses in the Tempe Union High School District has resulted in costs between \$100,000 and \$300,000 per campus. These costs include cafeteria renovations, security fencing, and additional security and food service personnel. Costs in other school districts may be greater or less than this amount depending upon existing infrastructure.

Affected Parties

- # Students
- # Parents
- # Teachers
- # Food purveyors near high school campuses

DEFER EMISSIONS ASSOCIATED WITH GOVERNMENTAL ACTIVITIES

THIS MEASURE APPLIES TO THE
FOLLOWING POLLUTANTS:
VOCs, HAPs

Background and Description of Measure

Seek legislation that would require State agencies and political subdivisions in the Maricopa County Ozone Nonattainment Area to cut back during the summer ozone season on those activities that are ozone-producing. Specifically, those entities would be required to shift the timing, or to postpone altogether until after the ozone season, where practicable, a variety of emission-producing activities to reduce their contribution to ozone formation. Some of the measures which these entities would be required to implement, where feasible and appropriate, include the following:

- # Prioritizing and rescheduling of painting, metal coating, refinishing, and other VOC emitting activities to occur either before May 1 or after September 30 each year
- # Minimizing use of two-cycle gasoline-powered lawn and garden maintenance equipment, or defer landscaping activities as well as painting, metal coating, refinishing and other VOC emitting activities until after 4:00 pm
- # Scheduling gasoline-powered fleet refueling after 4:00 pm (exempting public safety, law enforcement, emergency services and other essential vehicles)

In addition, State agencies and political subdivisions could be required to include in all procurement solicitations for VOC-containing commodities a request for substitute products with lower or no VOC content. Substitute products should not increase toxicity as a trade-off for lower VOC content.

Implementation Mechanism

This measure would have to be passed by the State Legislature and enacted by the Governor. Buyers and others working in the public sector procurement process generally lack knowledge on product substitution. This can be a significant barrier to the success of this measure. Training and information sharing through the Clean Air Challenge well in advance of the summer ozone season is necessary to ensure that products bought early in the calendar year for use during the summer months have low or no VOC content.

Cost and Effectiveness of Measure

Projects subject to existing contracts would need to be excluded to avoid penalties associated with changes or cancellation. Effectiveness depends upon degree of cooperation and interest by each affected State and local agency. Effectiveness of implementation could be determined by measuring methods to be developed by ADEQ.

PART IV

AIR POLLUTION CONTROL MEASURES WITHDRAWN OR REJECTED BY THE AIR QUALITY STRATEGIES TASK FORCE OR ITS SUBCOMMITTEES

Regional Bicycle System Measure – Withdrawn

Stage II Vapor Recovery Measure II: Annual Test with One Visual Non-Compliance
Follow-up Inspection – Rejected by Task Force

Transient Loaded Test for Older Model year Vehicle Measure – Withdrawn

Study on Parking Management Strategies Measure (Decision on November 6 was to send this measure to the Transportation Task Force for their review and possible inclusion in their report)

Gasoline reformulation – 3% VOC reduction performance standard – Rejected by Task Force

Control of motor vehicle emissions from vehicles driven by non-residents – Rejected by Task Force

Expansion of the Clean Air Campaign – Rejected by CO Subcommittee

Public Education: Wood Burning Alternatives – Rejected by CO Subcommittee

“Proposed CO Containment Measure” that would have allowed the public to burn firelogs during “no burn days” – Rejected by CO Subcommittee

“Proposed Fireplace Education Program” that would have required MAG to do modeling on wax logs –
Rejected by CO Subcommittee

Adopt CARB Reformulated Diesel Fuel Standard – Rejected by PM₁₀ Subcommittee

VLT Exemption or Discount for Vanpools

APPENDIX A
DETAILED HISTORY OF AIR QUALITY ISSUES
IN THE PHOENIX URBAN AREA

APPENDIX A

DETAILED HISTORY OF AIR QUALITY ISSUES IN THE PHOENIX URBAN AREA

The Federal Clean Air Act

Besides the potential for serious health effects, there are regulatory repercussions of poor air quality. In 1970, Congress amended the 1967 Air Pollution Control Act, renaming it the Clean Air Act (CAA). Today the CAA is the principal legislation governing air quality nationwide. The purpose of the CAA is to control and improve the nation's air quality, which is affected by rapidly expanding urban growth, industrial development, and increasing use of motor vehicles. The intent of the CAA is to protect and enhance the quality of the nation's air resources and initiate programs that will encourage long-term air pollution control. The primary agency that governs air quality nationwide is EPA, which administers the CAA and sets NAAQS. NAAQS define levels of air quality that EPA judges to be necessary, with an adequate margin of safety, to protect public health and welfare. NAAQS are defined in terms of the allowable concentration of a pollutant in the air we breathe. Pollutants with established NAAQS are called criteria pollutants and include sulfur dioxide, PM, CO, ozone, nitrogen dioxide, and lead.

The main goal of the 1970 CAA was for states to attain NAAQS by 1975. To do this, EPA attempted to put in place national programs and exercise tight centralized control. The goals were not met by 1975, and air quality in many parts of the country continued to deteriorate. In 1977, Congress amended the CAA, including specific requirements for states to document air quality problems, classify areas that did not meet standards, and develop plans for these areas to attain the standards. The 1977 amendments also specified the types of control programs that must be considered and implemented to control sources other than industrial smokestacks. The 1977 amendments were designed to do what the CAA had failed to do thus far: Censure the attainment of the national standards. Congress greatly increased the responsibility of both state and local governments to find their own solutions to their particular problems. The new attainment deadline was set at 1982, with the possibility of acquiring extensions to 1987.

By the mid- to late-1980s, it was widely acknowledged that the 1977 amendments to the CAA were inadequate, and, to an extent, had failed. While there were some successes, especially related to certain types of rural, industrial nonattainment areas (e.g., control of copper smelter emissions), numerous problems were evident:

- Fewer than 5 of the more than 100 urban nonattainment areas had attained the NAAQS, and many were far from reaching attainment, even in 1987.
- Implementation of revised ambient air quality standards, as exemplified with PM₁₀ NAAQS, was unclear, and imposed impossible deadlines on states.
- The Prevention of Significant Deterioration program had failed to prevent significant deterioration, and had not adequately addressed visibility protection for scenic and sensitive areas.

- New Source Review requirements for approval of construction of new and modifications to existing sources did not necessarily control air pollution once new sources went into operation.
- Emissions standards had been developed for only a handful of HAPs, and the process for development of the standards was considered to be arduous and excessively complex.
- New challenges had arisen, including stratospheric ozone protection and acid rain control.

After eight years of active consideration and a summer of intensive negotiation that resulted in the CAA Amendments of 1990, which were signed into law by President Bush on November 15, 1990. This law substantially reformed the Act by creating new programs and increasing the specificity of requirements:

- Title I of the Amendments provided specific and expanded requirements for addressing visibility protection, including the ability to establish multi-state commissions, and created the Grand Canyon Visibility Transport Commission. These provisions also substantially changed how nonattainment problems were to be addressed, with provisions for different compliance dates and specific emissions control requirements that were dependent upon the severity of each area's nonattainment problems. For the first time, the CAA contained legal and regulatory structure for dealing with inability to attain standards.
- Title II provided for additional standards for new motor vehicles and enhanced IM programs for motor vehicles, oxygenated and reformulated gasoline, a low emissions vehicle program, and standards for nonroad engines.
- Title III completely reformed requirements related to HAPs, listing 189 chemicals as HAPs, setting deadlines for establishment of industry-specific, technology-based standards, and requiring risk assessment studies by EPA.
- Title IV created requirements for control of acid rain, including the first mandatory, national, market-based approach to emissions reductions.
- Title V required states to establish fee-supported operating permit programs, including specific requirements addressing the contents of permits, compliance monitoring and certification, revision of permits, and small business assistance.
- Title VI created the program for implementing the Montreal Protocol, an international agreement to which the United States is party, which bans manufacture of stratospheric ozone depleting substances and requires development of substitute products.

ARIZONA'S PURSUIT OF CLEAN AIR

The 1970 CAA required that each state submit a SIP demonstrating how it would meet the NAAQS for ozone (then called photochemical oxidants), CO, TSP, and sulfur dioxide by 1975. Arizona submitted its SIP in 1972 and in 1975 was a pioneer in the quest for cleaner air when it became the second state in the nation (after New Jersey) to implement a centralized vehicular emissions IM program. The program, which became mandatory in 1976, required that all 13-year old and newer model year vehicles registered in metropolitan Phoenix and Tucson undergo annual testing. Vehicles showing higher than allowable emissions were required to be repaired.

Nonattainment Area Plans CO Ozone and CO

In the spring of 1978, Phoenix and Tucson were identified as two of more than 90 areas in the nation not meeting the CO standard; and two of more than 70 areas not meeting the ozone standard. The State was required to prepare nonattainment area plans (NAPs) and incorporate them into the SIP. In 1979, Arizona submitted plans developed by the Arizona Department of Health Services governing CO and ozone. The plans, which also contained traffic flow improvements, public transit, and ride sharing, were conditionally approved in May 1982, pending submission of approvable installation permit rules for stationary air pollution sources.

Despite implementation of the approved NAPs, neither area was in attainment for CO in 1982. The ozone standard, however, had been relaxed in 1981: Tucson was able to meet the relaxed standard and correct its nonattainment classification, but Phoenix was still a nonattainment area for ozone in 1982.

New NAPs for CO were prepared in 1982 for both areas, and in 1984 a revision to the MAG ozone plan was prepared as well. All NAPs modeled attainment by 1987, relying on:

- Enhancing the vehicle emissions inspection program by requiring testing of all 1969 and newer model year vehicles;
- Maintenance of new car standards; and
- Local commitments to implement traffic flow improvements, public transit, and ridesharing.

Based on the adequacy of the SIP and progress that had been made toward achieving its requirements, a request was submitted for extension of the attainment deadline to December 31, 1987.

Citizen Suit Challenging Approval of Maricopa and Pima County SIPs

In April 1985, the Arizona Center for Law in the Public Interest (ACLPI) filed a citizen suit under the CAA, which among other things challenged EPA's approval of the 1982 CO SIPs for Pima and Maricopa counties. ACLPI sought a court order directing EPA to prepare a federal implementation plan (FIP) and sanction the State of Arizona as well as Pima and Maricopa counties for their failure to comply with the law. In February 1986, EPA entered into a stipulation with the plaintiffs agreeing, among other things, to monitor Arizona's actions and make a determination by the end of 1986 as to whether the State was making reasonable efforts to submit new, approvable CO NAPs for Maricopa and Pima counties.

During the regular legislative session in 1986, legislation was enacted that increased the stringency of the vehicle emissions inspection program by adding a four-point check for tampering with emission controls as well as requiring testing of diesel vehicles to begin in January 1987. That legislation also required revisions to the CO SIPs be prepared for Pima and Maricopa counties. All SIP revisions were to demonstrate attainment of federal air quality standards as "expeditiously as practicable."

In the fall of 1986, EPA disapproved the Pima and Maricopa county CO SIPs; refused to extend the attainment deadline to December 31, 1987; and imposed a construction ban on new, major CO sources. Arizona challenged the disapproval in federal court, but EPA was upheld. The State responded and in December 1986, interim CO

SIPs for both Pima and Maricopa counties were submitted to EPA. Those Plans incorporated the provisions of the 1986 legislation as well as local commitments to transportation controls. On January 14, 1987, EPA, in a letter to the plaintiffs, found that Arizona was making reasonable efforts to submit revised SIPs. The plaintiffs disagreed and filed a request for summary judgment requiring EPA to impose highway funding sanctions against Arizona and to develop a FIP.

The 1987 Omnibus Air Quality Bill

In 1987, the Legislature passed an omnibus air quality bill that contained:

Numerous requirements for additional emissions control measures for cities, towns, and counties in CO nonattainment areas, including traffic signal synchronization, inclusion of bicycle facilities in general plans, and purchase of alternatively fueled buses;

- Establishment of the Public Transportation Assistance Fund;
- Tax credits for businesses that subsidize the use of public transit by their employees;
- Requirements that any Arizona-registered vehicle used to commute into a nonattainment area for employment or school comply with the testing requirements; and
- Establishment of the Air Quality Fee Fund for the purposes of conducting research and demonstration projects to reduce CO and ozone, and to provide grants to political subdivisions of the State for such purposes. Income to the fund was estimated to be approximately \$3 million the first year.

On August 10, 1987, the Federal District Court in Tucson issued a partial judgment in favor of ACLPI, ordering EPA to, by March 31, 1988, either implement a FIP or approve the CO SIPs for Maricopa and Pima counties. On November 30, 1987, EPA published an Advance Notice of Proposed Rule Making (ANPRM) describing the CO control measures likely to be included in the FIP, and proposing highway funding sanctions. The proposed FIP contained provisions eliminating waivers in the IM program, a mandatory oxygenated fuels program, and a trip reduction ordinance in Maricopa County.

While EPA was proposing a federal plan to deal with air pollution in the State's two largest urban areas, MAG was conducting research on the feasibility of oxygenated fuels as a CO control strategy, and development of an employer-based trip reduction ordinance. Both studies resulted in recommendations to implement these control measures as SIP provisions.

In March 1988, EPA requested an extension of the deadline for promulgating the CO FIP until December 31, 1988, which was approved, but only until August 10, 1988. EPA proposed a FIP that, by its calculation, would result in attainment of the CO NAAQS by December 31, 1991. It contained only two control measures: an oxygenated fuels program and an employer-based travel reduction ordinance.

The 1988 Omnibus Air Quality Bill

In 1988 the Legislature responded to these developments by passing another omnibus air quality bill. The bill:

- Refined the numerous requirements contained in the 1987 legislation;
- Provided incentives for conversion of government vehicles to compressed natural gas;
- Required sale of oxygenated fuels, to commence on October 1, 1989;
- Established a more stringent IM test for 1981 and newer model year vehicles, called the loaded test, to commence on January 1, 1989; and
- Set up an employer-based TRP for work sites with 100 or more employees, to commence on January 1, 1989.

On August 10, EPA approved the Maricopa County CO SIP as meeting all of the requirements of the District Court order.

The EPA CO FIP

On December 19, 1988, ACLPI appealed EPA's approval of the Arizona SIP for CO to the Ninth Circuit. Oral arguments were heard on June 26, 1989, but a final decision was not issued until April 11, 1990. The Court set a deadline of November 26, 1990 for promulgation of the FIP.

The proposed FIP, which was published October 10, 1990, included contingency plan procedures governing federal transportation projects in Pima and Maricopa counties, conformity procedures, and two new control measures in Maricopa County. Can increase in the oxygen content from 2.3 to 2.7 percent for oxygenated fuels, and a reduction in the maximum allowable volatility of gasoline for October through March. Both proposed programs would go into effect on October 1, 1991 and again, attainment was projected for December 1991. The final FIP was published on February 11, 1991. The only substantial change from the proposed FIP was the elimination of the oxygen content averaging and credits trading program from the oxygenated fuels program.

On June 11, 1991, ADEQ submitted a revision to the Maricopa County CO SIP adopting the two federal control measures in the FIP. EPA proposed approval of these control measures and withdrawal of the FIP control measures on August 14, 1991 and promulgated the final approval on March 9, 1992.

In 1992 after intensive negotiations, the Arizona Legislature passed the "Arizona Clean Air Act Amendments", SB 1430, designed to make Arizona's clean air statutes consistent with the requirements of the 1990 CAA Amendments. The legislation's major provisions included:

- Expansion of the oxygenated fuels control area to include all of Maricopa County;
- A Stage II Vapor Recovery program under the jurisdiction of ADWM;
- Specific provisions governing development and implementation of nonattainment area plans and planning procedures;

- Authority to develop and implement an enhanced stationary source permitting program that meets the CAA requirement for State operating permits program and regulation of hazardous air pollutants;
- Authority for collection of fees dedicated to the stationary source permitting program; and
- A State HAPs program, including research on sources and impacts of HAPs from all sources.

On November 13, 1992, the State submitted SB 1430 to EPA as a revision to the SIP.

On June 23, 1993, the State submitted House Bill (HB) 2129 and MAG contingency procedures as a revision to the SIP. This submittal included a contingency measure, elimination of the 1 psi RVP exemption for ethanol blends during the oxygenated fuels season, as a substitute for the FIP contingency highway project delay process. The purpose of the submittal was to entirely replace the FIP contingency plan.

On June 28, 1993, EPA published a notice announcing that violations of the CO standard were measured in Maricopa County, indicating that the FIP and approved SIP were inadequate and that additional control measures were necessary to attain the CO standard. In addition, the notices proposed commencement of the FIP contingency process, including a list of highway projects potentially subject to delay. This action triggered implementation of the State contingency measure, requiring ADWM to notify gasoline marketers, blenders, and suppliers of the elimination of the RVP exemption for ethanol blends.

Control Measure SIPs for CO and OzoneCMaricopa County

CO and ozone control SIPs were due to EPA on November 15, 1993, and it was generally acknowledged that legislative action would be necessary in order to meet the requirements of the CAA. On September 1, 1993, pursuant to 1993 Regular Session Legislation, ADEQ and MAG prepared a report to legislative leadership on CO and ozone control programs that would yield attainment of both NAAQS by December 31, 1995 and November 15, 1996, respectively. In addition, leadership in both houses of the Legislature hired their own consultant to assist them with decision making. A special session was called in November, which resulted in an omnibus air quality bill, HB 2001. The bill contained a wide array of pollution control programs, the most important of which include:

- Enhanced vehicle emission inspection, which included the EPA enhanced testing for 1981 model year and newer vehicles, both loaded and idle tests for 1967 through 1980 model year vehicles, and higher waiver limits;
- An on-road, vehicle remote sensing program requiring that vehicles identified as **Adirty@be** repaired and comply with the vehicle emissions inspection requirements (This is now the most stringent such program in the nation);
- An increase in the minimum oxygen content of oxygenated fuels;
- More stringent summer and winter gasoline volatility specifications;
- Expansion of the Maricopa County travel reduction program, extending to sites with 50 or more employees;

- A variety of minor source industrial controls;
- Requirements for conversion of government fleets to alternative fuels;
- Tax incentives for private conversion of vehicles to alternative fuels;
- Restrictions on fireplace use during high pollution periods; and
- Contingency measures providing for enhancement of the remote sensing program, and a catalytic converter replacement program. (As required under the 1990 amendments, both of these contingency measures can be put into effect within 60 days without additional legislative action by either the Legislature or ADEQ).

On November 15, 1993, the State submitted control measure SIPs for CO and ozone for Maricopa County, as required under Part D of the 1990 Amendments. This was followed by submittal of a CO demonstration of attainment and all other necessary components for both pollutants on April 4, 1994.

On November 15, 1994, the State submitted the final enhanced and basic vehicle inspection and maintenance programs as a SIP revision, in support of the CO and ozone plans for Maricopa County. This SIP revision was declared complete by EPA and approved on May 8, 1995.

On July 11, 1996, ACLPI filed suit against EPA for failure to implement the FIP contingency plan and take timely action on the Maricopa CO SIP submitted in 1993. On August 13, 1996, ACLPI filed a complaint in federal district court asking for an order that EPA impose an ozone FIP.

A special legislative session was held in July 1996. The legislation resulting from the special session required numerous studies and the following measures:

- Enhancement of the Clean Air Fund under the Department of Commerce by providing additional dedicated sources of funding, and specifies the mission of the Fund, which is primarily aimed at encouraging the use of alternative fuels through grants and other programs
- An increase in the stringency of the vehicle emissions inspection program in Maricopa County by allowing only one waiver from meeting the IM standards, and enhancing the vehicle repair grants program, by reducing the cost-sharing requirements
- Full funding for the vehicle emissions programs through June 30, 1997
- Implementation of an enhanced diesel vehicle test
- Elimination of pre-1988 heavy duty, on-road diesel engines after January 1, 2004

On July 29, 1996, EPA reclassified the Maricopa County CO Nonattainment Area from moderate to serious, based on violations of the CO NAAQS measured in 1995 and 1996. This triggered the contingency measures contained in the SIP, which are now being implemented.

Progress Toward Reducing PM₁₀

Meanwhile in 1987 EPA had promulgated a revised particulate matter standard, abandoning TSP and establishing NAAQS for particulate matter with an aerodynamic diameter of 10 microns and smaller (the so-called Inhalable particulate[®]), or PM₁₀ standard. Revisions to SIPs for all areas in violation of the new PM₁₀ NAAQS were due in April 1988. The MAG PM₁₀ SIP was submitted to EPA in April 1988, based on an inventory of PM₁₀ sources prepared by EPA in 1987. The plan on its face provided only a small fraction of the emissions reductions necessary for attainment of the standard.

In 1989, ADEQ commenced implementation of an Urban Haze/PM₁₀ Study designed to describe the nature and sources of the "brown cloud" and improve the emissions profiles for PM₁₀ in the county. In 1991, ADEQ completed the "brown cloud" study, which revealed a number of flaws in the inventory of emissions sources prepared by EPA for Maricopa County. Results showed that the majority of visible pollution comes from vehicle tailpipes, and the vast majority of PM₁₀ emissions arise from traffic on paved roads (including reintrained dust and tailpipe emissions). A MAG PM₁₀ Plan was submitted to EPA on November 15, 1991, and, while the plan contained a variety of control programs, they did not add up to attainment. Further, the emissions inventory used to develop the plan was a revision of the inventory used in the 1988 plan, which was proven to be grossly inaccurate. MAG, Maricopa County, ADOT, and ADEQ agreed to revise the plan as soon as feasible, basing it upon the results of the "brown cloud" study.

Arizona submitted a PM₁₀ SIP to EPA in two installmentsCone on August 11, 1993, and an addendum to that Plan on March 3, 1994. The Plan relied on a variety of local commitments to dust control measures, including a new Maricopa County dust control ordinance; however, the Plan did not demonstrate attainment of the PM₁₀ NAAQS by December 31, 1994. Unlike Plans for CO and ozone, which are required to demonstrate attainment, the CAA requires that PM₁₀ Plans only demonstrate that all Reasonably Available Control Measures (RACM) will be implemented. If all RACM are implemented, but attainment cannot be demonstrated, the State can find that attainment is impracticable. Arizona applied these approaches to the revised moderate PM₁₀ SIP.

Shortly after the submittal of the revised PM₁₀ SIP, MAG, Maricopa County, and ADEQ commenced a "microscale" analysis of the PM₁₀ problem, which focused on specific activities and land uses that cause localized violations of the PM₁₀ NAAQS. It was the contention of ADEQ that an extension of the attainment deadline and completion of this study would result in crafting of control measures at these "hot spots" that can be highly cost effective and result in near-term attainment of the PM₁₀ NAAQS.

ACLPI filed its first action regarding that plan on July 28, 1994, demanding among other things that EPA produce a FIP because the Phoenix PM₁₀ Plan was unapprovable. EPA stayed court action on the FIP by commencing negotiations with ACLPI. EPA subsequently published its final approval of the PM₁₀ plan on April 10, 1995. Later on April 27, 1995, ACLPI filed its suit *Ober vs EPA* appealing EPA's approval of the moderate PM plan.

Moderate areas that submit plans which do not demonstrate attainment, like the Maricopa County Area, trigger a requirement that EPA reclassify the area from moderate to serious nonattainment. EPA reclassified the Maricopa Area to serious effective June 10, 1996. Areas reclassified to serious because of failure to attain the standard are required to, within 18 months of reclassification, submit an air quality plan to EPA that demonstrates compliance with the PM₁₀ standards as expeditiously as practicable, but no later than December 31, 2000. The plan is required to include regional application of BACM for all "significant" sources of PM₁₀ emissions. In addition, the major source threshold for stationary sources goes from 100 to 70 tons per year.

On May 14, 1996, the Ninth Circuit ruled in *Ober*, among other things, that EPA's approval of the Moderate Area Plan was improper because the State failed to include an analysis of the impact of RACM on violations of the 24-hour NAAQS. Through discussions with ADEQ, ACLPI, and Maricopa County, EPA has recommended and ADEQ has agreed to prepare and submit to EPA by March 1997, a plan revision that addresses the 24-hour violations at the sites studied in the micro-scale analysis. While ADEQ will prepare the portion of the plan that addresses the 24-hour violations at the microscale sites, MAG will be preparing the regional plan that addresses annual violations. That portion of the plan will be submitted in December. In this way, Arizona will fulfill the requirement to cure the defective Amoderate SIP and comply with the requirement for an approvable Aserious plan.

The serious nonattainment area PM₁₀ SIP for Maricopa County is due to EPA in December 1997. The plan will be prepared through the cooperative effort among ADEQ, ADOT, Maricopa County, and MAG. The SIP must include emission reduction measures that will be sufficient to meet both the 24-hour and annual PM₁₀ standard by December 31, 2001.

In comments made to the PM Subcommittee, David Baron, Assistant Director of ACLPI, indicated his organization's intent to possibly re-activate the suit demanding EPA produce a FIP, although ACLPI would prefer that Arizona take appropriate action. The approvability of the PM₁₀ 24-hour attainment demonstration plan will bear on whether the suit is re-activated. According to Mr. Baron, EPA should have already placed the Maricopa Nonattainment area under a FIP. If ACLPI is successful in its litigation, decisions regarding the measures to reduce PM₁₀ would no longer be placed in the hands of state, county, and local officials. Instead, these decisions would be made by the EPA office in San Francisco.

The technical work for the final PM₁₀ SIP Plan to evaluate the causes of the 24-hour exceedences is currently underway. Work to date has preliminarily concluded that all 24-hour PM₁₀ exceedences are associated with fugitive PM₁₀ emissions. Maricopa County's Rule 310 addresses virtually all of the sources potentially generating these fugitive PM₁₀ emissions. However, finalized microscale emissions inventories developed to analyze each 1995 exceedence will be completed December, 1996. The regional emissions inventory based on calendar year 1995 will also be completed by the end of December 1996.

APPENDIX B
MEMBERS OF THE CO AND PM₁₀ SUBCOMMITTEES

APPENDIX B

MEMBERS OF THE CO AND PM₁₀ SUBCOMMITTEES

Carbon Monoxide Subcommittee

- # Bill Pfeifer, Chairperson, American Lung Association of Arizona
- # Penny Allee, Southwest Gas Corporation
- # Sandy Bahr, Arizona Audubon Council
- # Lindy Bauer, Maricopa Association of Governments
- # William Kicksey, Maricopa County Environmental Services Department
- # Nils Larson, Salt River Project
- # Cathy Lauerman, Printing Industries Association of Arizona
- # Charlie Stevens, Western States Petroleum Association
- # William Wiley, Arizona Public Service
- # Kara Young, Salt River Project

PM₁₀ Subcommittee

- # David M. Martin, Chairperson, Arizona Rock Products Association
- # Penny R. Allee, Southwest Gas Corporation
- # Sandy Bahr, Arizona Audubon Council
- # David Berry, Swift Transportation
- # Lindy Bauer, Maricopa Association of Governments
- # Dallas Coonrod, Arizona Chapter, Associated General Contractors
- # David Feuerherd, American Lung Association of Arizona
- # William Kicksey, Maricopa County Environmental Services Department
- # James Klinker, Arizona Farm Bureau
- # Nils Larson, Salt River Project
- # John Mangum, Contractors Information Council of Arizona
- # Charles Stevens, Western States Petroleum Association
- # William Wiley, Arizona Public Service

APPENDIX C
REPORT OF THE TASK FORCES'S AFTERMARKET
DEVICE SUBCOMMITTEE

November 4, 1996

To: Mr. Roger Ferland, Chairman
Arizona Air Quality Task Force

From: Chris Andrews, Subcommittee Chairman
on Aftermarket Retrofit Devices

Re: Final Report of the Subcommittee on After Market
Consumer Products for Mobile Sources

This letter will constitute the final report of the subcommittee on after market consumer products for mobile sources. On August 27, 1996 you sent me a letter stating that the Air Quality Strategies Task Force needs a subcommittee to make recommendations to the Task Force concerning after market consumer products that have been proposed to the Task Force by various parties to reduce emissions from mobile sources. I accepted your request to act as the Chairman of the subcommittee, and to make recommendation in the following areas.

- Should the Task Force consider specific commercial products or general categories of commercial products that claim to reduce emission from mobile sources?
- Should the Task Force consider the efficacy of commercial products or categories of commercial products as far as reducing mobile source emissions?
- If the Task Force should evaluate the effectiveness of particular commercial products or categories of commercial products, how should that evaluation be accomplished?

The Subcommittee agreed that the answer to the first two questions regarding specific commercial products or general categories of commercial products is "no". By answering "no" to the first two questions, the third question does not require an answer. The Subcommittee did agree to make a recommendation regarding the review and evaluation of any aftermarket device(s) that may be proposed to the Arizona Department of Environmental Quality for the purpose of reducing emissions from mobile sources, and for the purpose of receiving emission reductions credits upon inclusion in the State Implementation Plan (SIP). This report shall summarize the EPA

Aftermarket Retrofit Device Evaluation Program (Section 511 Device Evaluation) and potential tampering liabilities, discuss the findings of the subcommittee, and make recommendations concerning ADEQ's role regarding aftermarket devices that claim to reduce air pollution from mobile sources.

EPA Aftermarket Retrofit Device Evaluation Program (Section 511 Device Evaluation)

The EPA evaluates after market retrofit devices including after market fuel additives under two authorities; Section 206(a)(2) of the Clean Air Act (42 U.S.C. 1857f-5) and Section 511 of the Motor Vehicle Information and Cost Savings Act (15 U.S.C. 2011). The EPA After Market Device Evaluation Program is the single evaluation and test program for these two authorizations. The applicable regulations are found in 40 CFR Parts 79, 86, 600 and 610. The program evaluates the effects of fully developed after market devices on vehicle emissions and fuel economy. These evaluations are intended to increase public knowledge and the results of the testing becomes public information. An official report summarizing the results is published in the federal register and is made available to the general public through the National Technical Information Service (NTIS) and elsewhere. EPA findings do not constitute approval, endorsement or certification of these additives, devices or systems.

The EPA requires a completed application prior to conducting an evaluation. Applications must contain test data collected by an independent laboratory demonstrating significant emission reduction and/ or fuel economy benefits from using the device. The results of the screening tests are included in the application that is submitted to the EPA. The EPA participates in the development of the test protocol, and reviews the test results to determine if the results are statistically significant. The applicant may then proceed with confirmatory testing by EPA at its laboratory. The applicant pays for all testing.

EPA's evaluation s include the complete Federal Test Procedure (FTP). The FTP is the only valid test used to evaluate devices for emission effects.

Potential Tampering Liability

Section 203 (a)(3)(A) and Section 203 (a)(3)(B) of the Clean Air Act prohibits any person from knowingly removing or rendering inoperative any emission control device or element of design installed on or in a motor vehicle or motor vehicle engine. Civil penalties for a violation of each Section is \$10,000.00 and \$2,500.00, respectively. The Clean Air Act of 1990 does prohibit individuals, from tampering with the emission control devices on in-use vehicles. However, it is EPA's enforcement policy not to initiate enforcement proceedings against a regulated party who installs a retrofit device

if that person has a reasonable basis for knowing that the use of that device will not adversely affect emission performance. This policy is set out in Mobile Source Enforcement memorandum No. 1A.

In order to establish a reasonable basis for knowing that emissions are not adversely affected by the installation of the retrofit device, the manufacturer of the device represents in writing, that federal test procedures (FTP) emission tests have been performed as prescribed in 40 CFR 86 showing that the device does not cause similar vehicles to fail to meet applicable emission standards for their useful life. The results of the FTP tests are valid only for similar vehicles.

It is recommended that any installer of any after market retrofit device understand the legal and potential financial implications of Mobile Source Enforcement memorandum 1A.

Findings & Recommendations of the Subcommittee

During the subcommittee meetings, the manufacturer of the following aftermarket devices made a presentation. The name, type of device and a brief description are summarized below:

Name of the Device	Type of Device	Brief Description
Power Tech 2000	Fuel Line Device	A type of device installed in the fuel line that supposedly causes a beneficial ionization of the fuel.
The "En-Valve"	Replaces the PCV valve	A device that is intended to replace the PCV valve on a vehicle with accumulated mileage.
RxP Fuel Additive	A chemical or mixture added to gasoline or diesel	A fuel additive claimed to reduce vehicular emissions.
Lambda	Catalyst Retrofit	A system that monitors and controls the carburetor air to fuel ratio after installing a new 3-way catalyst.

At the meetings of the subcommittee, the aftermarket device manufacturers, in general relied on testimonial that their devices reduce emissions. For test results, the IM 240 was used in an attempt to demonstrate emission reductions. Testimonial and IM 240 results are wholly inadequate to support a contention that a retrofit device can reduce

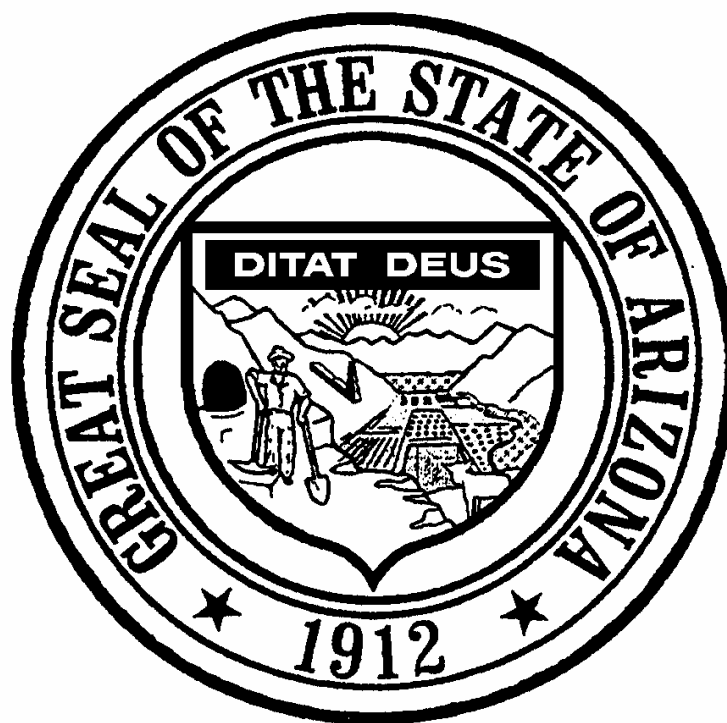
vehicular emissions. The EPA has made it clear that FTP test only can be used to demonstrate emission reductions. The Task Force could not support any claim for emission credits for a device that has not been tested in accordance with 40 CFR Part 86. It should also be recognized that any manufacturer of a retrofit device that does not have a reasonable basis, i.e., FTP test results that show statistically significant emission reductions, may be subject to allegations of tampering. Any person who sells, services, repairs, or replaces such a device may also be subjected to allegations regarding tampering.

The recommendations of the subcommittee are to make statutory changes to achieve the following:

1. The EPA Aftermarket Retrofit Device Evaluation Program evaluates the effects on fuel economy and emission results when conducting tests on aftermarket devices. For this reason it is recommended that inquiries made to ADEQ regarding aftermarket retrofit devices be referred to the Energy Office of the Arizona Department of Commerce. The Commerce Department would assist an applicant who is considering performing FTP test on a fully developed device, or is in need of information regarding the federal testing process.
2. Upon submitting to ADEQ, the results of Federal Test Procedures for screening and confirmatory testing performed by EPA, or California Air Resources Board (CARB) considered by the EPA to be at least equivalent to FTP tests, ADEQ may evaluate the results of these tests for possible inclusion into the State Implementation Plan after considering costs, implementation and enforcement issues as it relates to the use of the device in the State of Arizona.

APPENDIX D
REPORT OF THE TASK FORCE'S MARICOPA COUNTY
NONATTAINMENT AREA FUELS SUBCOMMITTEE

**REPORT OF
THE MARICOPA COUNTY
NONATTAINMENT AREA
FUELS SUBCOMMITTEE
OF THE**



**AIR QUALITY STRATEGIES
TASK FORCE**

Bill Wiley, Chairman
November 26, 1996

REPORT OF THE MARICOPA COUNTY NONATTAINMENT AREA FUELS SUBCOMMITTEE OF THE AIR QUALITY STRATEGIES TASK FORCE

EXECUTIVE SUMMARY

In order to try to prevent violations of the ozone standard in 1996 and the subsequent downgrading of the Maricopa County nonattainment area to Aserious@, Governor Fife Symington convened the Ozone Strategies Task Force in May 1996. The Task Force was renamed the Air Quality Strategies Task Force in July 1996, and was charged with development of a report describing long- and short-term strategies that would contribute to attainment of the federal health standards for ozone, carbon monoxide and particulates. The Ozone Strategies Task Force recommended establishment of a Fuels Subcommittee in their July 1 report to the Governor (Attachment 1) to evaluate potential short-term and long-term fuels options for the nonattainment area. The Fuels Subcommittee convened in July 1996, and ADEQ retained MathPro, Inc. to evaluate potential fuels options. MathPro was charged with identifying prospective fuel formulations, conducting refinery modeling to assess fuel production costs, assessing gasoline supply and distribution system impacts, and evaluating emissions changes expected for each fuel. The MathPro Final Report is in Attachment 2 to this report. Results of this study and the Subcommittee discussions are:

- All fuel options would increase the cost of producing and using fuel from 2.3 to 17.34 per gallon in the Maricopa County nonattainment area, except for the low Reid Vapor Pressure (RVP) option, which has no net cost impact.
- Very limited benefits can be derived from further RVP reductions given the existing low RVP gasoline limit (7.0).
- Emission modeling indicates that the greatest volatile organic compound (VOC) reductions come from California Air Resources Board (CARB) Phase 2 reformulated gasoline, the 10% VOC performance standard, and federal reformulated gasolines.
- Carbon monoxide, hazardous air pollutants, and to some extent, particulate pollution, would also be reduced by almost all fuel formulations examined. Greatest reductions would be from CARB Phase 2 and federal reformulated fuels.

The costs, emissions reductions and cost-effectiveness for all fuel formulations are summarized in Table 1 and Figures 1 and 2.

- Urban Airshed Modeling was used to evaluate emission reductions for a matrix representing some fuel formulations, using Phoenix meteorological conditions for a 1992 ozone event. Initial results show limited ozone reduction benefits (maximum two parts per billion) from fuel emission reductions, and by inference, any other control measures with similar VOC reductions. VOC and CO emissions reductions were beneficial; NO_x reductions demonstrated a direction toward increasing ozone levels. Additional UAM modeling is being conducted for a 1996 ozone event and using revised emissions inventories.

- Supply and cost impacts outside the nonattainment area will occur until suppliers make the capital investments necessary to upgrade facilities throughout the distribution system to allow complete segregation of Maricopa County gasoline, and possibly until such capital investments have been amortized. Beyond that period, there should be no impacts outside the nonattainment area.
- The contractor found that fuel formulation options that call for significant capital improvements probably could not be implemented by all refiners by the summer of 1999.
- The Subcommittee did not identify any short term options for 1997 which it could support.
- Only fuel production, delivery and fuel economy costs for Maricopa County were addressed in this study. Fuel price is a function of competition and other market factors outside the scope of this study.
- Besides impact on ozone concentrations, key issues to consider if a new fuel is adopted are:
 - Implementation time frame and mechanisms for compliance assurance.
 - Monitoring quality of fuels outside the nonattainment area.
 - Potential new supply options, especially from the East.

Based on the analyses to date, the Subcommittee recommends that:

- CARB Phase 2 reformulated gasoline (RFG), Federal Phase II RFG, 10% VOC reduction and performance based analogs of these fuels as may be necessary to attain the ozone standard by 1999, be further evaluated for relative emissions reductions benefits and costs as compared to other contemplated control measures.
- The State fund the proposed wintertime fuels study (Attachment 3). Data on gasoline properties be collected from refiners and maintained as confidential business information to support this study.
- The cost-effectiveness of all other feasible ozone reduction measures, including non-road mobile sources, be considered using similar methodology (e.g. apportionment of capital recovery over the summer months only) and to the depth with which the Subcommittee evaluated the fuels.

TABLE 1: SUMMARY OF COST AND EMISSION REDUCTIONS IN METRIC TONS BY FUEL

	COST		(d) Cost- Effectiveness (\$M/VOC ton /day)	EMISSIONS REDUCTIONS, 1999 SUMMER DAY, MARICOPA COUNTY (metric tons/day)(c)							
FUEL OPTION	(a) \$M/Day	(b) 4/Gallon		(d) NOx Tons/Day	(d) VOCs Tons/Day	(e) PM	(f) CO	HAZARDOUS AIR POLLUTANTS (g)			
								Benzene	Buta- diene	Form- aldehyde	Benzene Equivalent
Low RVP	\$0	0.0	\$0 \$0	-0.2	2.4 0.5	0.01	20.4	0.23 0.04	0.01 0.01	-0.01 -0.01	0.19
Governor's Air Pollution Emergency Proc. (GAPEP)	\$74	2.3	\$18 \$15	1.3 2.6	4.2 5.0	0.35	44.5	0.1 0.02	0.01 0.01	-0.03 -0.02	-0.05
Federal Phase I -RFG (h)	\$245	7.4	\$63 \$34	0.3 1.1	3.9 7.2	0.25	108.8	0.81 0.47	0.07 0.01	-0.06 -0.09	1.24
Federal Phase 1 + 7.0 psi RVP Waiver (h)	\$247	7.5	\$28 \$22	0.2 1.1	8.7 11.0	0.27	118.6	0.82 0.48	0.08 0.01	-0.06 -0.09	1.29
10% VOC Reduction (Performance Standard)	\$223	6.7	\$18 \$17	0.0 1.2	12.1 12.9	0.27	38.6	0.16 0.12	0.10 0.03	-0.04 -0.02	0.45
Federal Phase II (h,i)	\$307	9.3	\$25 \$23	2.0 2.8	12.5 13.3	0.40	143.3	0.96 0.61	0.11 0.02	-0.06 -0.10	1.59
California Phase 2 RFG (CARB Phase 2)	\$571	17.3	\$41 \$37	8.2 8.8	14.1 15.5	0.76	198.9	1.39 1.00	0.24 0.07	-0.14 -0.14	2.79

Negative numbers denote emissions increases.

- Based on an estimated 78,600 bbls/day gasoline consumption, County-wide, in 1999.
- Based on refinery cost and fuel efficiency losses.
- Emissions are for the ozone nonattainment area.
- EPA Complex Model numbers are on top; CARB Predictive Model numbers below.
- EPA PART5 model.
- EPA Complex Model only.
- EPA Complex Model was used for all hazardous air pollutants (HAPs). Benzene equivalency is potency factor calculated as a weighted total of all HAPs in relation to benzene toxicity using the EPA potency values.
- Federal RFG, is a year-round program; emissions benefits were evaluated for summertime only; costs were annualized.
- Begins in year 2000 - Federal RFG and Federal RFG waiver fuels would transition to this fuel in 2000.

SOURCE: Assessment of Fuel Formulation Options for Maricopa County, MathPro, Inc. and Air Improvement Resource, Inc. (ADEQ, 1996)

FIGURE 1: COMPARISON OF EMISSIONS

REDUCTIONS IN 1999 BY FUEL OPTION

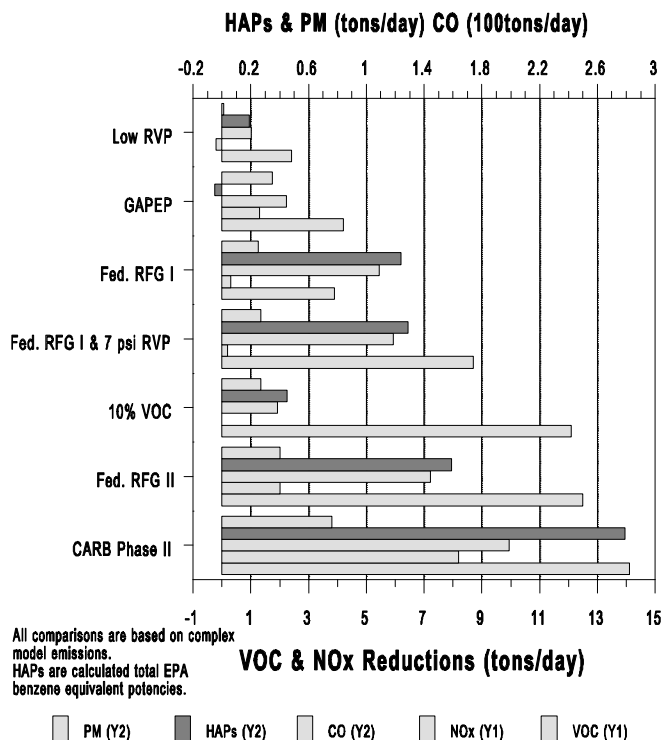
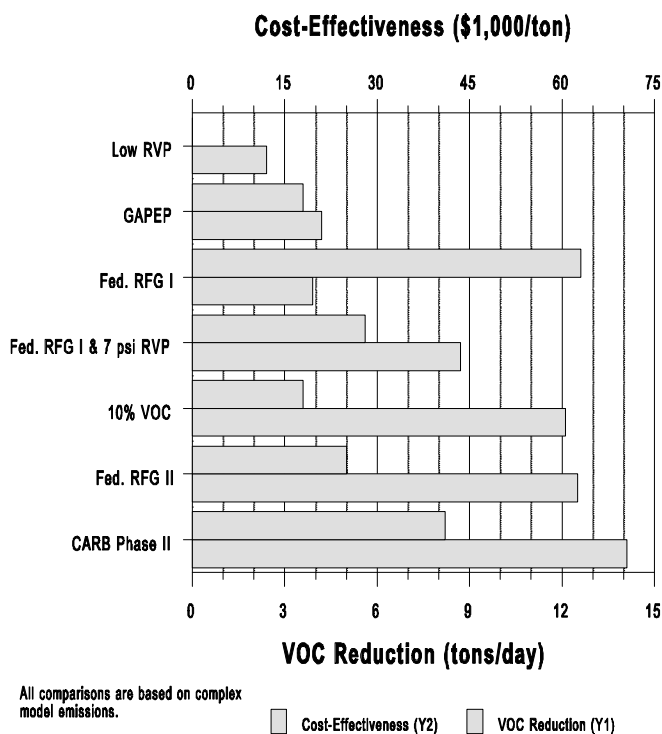


FIGURE 2: VOC REDUCTION AND COST-EFFECTIVENESS BY FUEL OPTION IN 1999

EFFECTIVENESS BY FUEL OPTION IN 1999



REPORT OF THE MARICOPA COUNTY NONATTAINMENT AREA FUELS SUBCOMMITTEE OF THE AIR QUALITY STRATEGIES TASK FORCE

INTRODUCTION

On May 24, 1996, Governor Fife Symington established an Ozone Task Force to identify short-term and long-term measures to reduce ozone violations for the 1996 ozone season and subsequent years. The initial report submitted on July 1, 1996, established a Subcommittee to address potential fuel formulations to help reduce ozone violations for Summer 1997 and following seasons. In response to the Task Force report, the Governor revised the Air Pollution Emergency Proclamation on July 17, 1997, and the Executive Order creating the Task Force, which called for the preparation of a report on summertime fuel formulations, and expanded the scope of the Task Force to evaluate potential control strategies for ozone, carbon monoxide and particulate matter. The Fuels Subcommittee was composed of a diverse mixture of interests representing gasoline-related industries, and both in-county and out-of-county interests. It first met on July 23, 1996, and submitted its final report to the Air Quality Strategies Task Force on November 26, 1996.

The Subcommittee members are listed below. (Names in parenthesis are alternates who regularly replaced the committee member.)

Chair - William Wiley, APS

Mary Ann Chapman, Tucson-Pima County Metropolitan Energy Commission

Doug Durante (Meredith Miller), Clean Fuels Development Coalition

David Feuerherd, American Lung Association of Arizona

Richard Foreman (Brian O'Donnell), Southwest Gas

Jerry Horn, Chevron Products Company

Randy Howes, Navajo Refining Company (2 vote)

James A Mike@Kulakowski, Texaco Refining and Marketing, Inc.

Debra Margraf, Arizona Automotive Trades Organization

Cathy Norris (Jerry Barnes), American Automobile Manufacturers Association

Paul Oves, Circle K Company/Tosco Corporation

Charles Schleyer, Mobil Technology Company

George Seitts (Mark Mexal), Giant Industries, Inc. (2 vote)

Chuck Shipley, Arizona Mining Association

Ira Domskey, Arizona Department of Environmental Quality (non voting)

PURPOSE

The mission of the Fuels Subcommittee, as specified in the July 1, 1996, Ozone Task Force Report (Attachment 1), was to evaluate potential fuel formulations that could reduce violations of the National Ambient Air Quality Standards (NAAQS) for ozone in the Valley, given Maricopa County vehicle demographics and meteorology. The Subcommittee was also asked to identify: both short-term (1997) and long-term fuel formulation options; their respective costs; expected changes in Maricopa County emissions for volatile organic compounds (VOC), oxides of nitrogen (NO_x), carbon monoxide (CO), particulate matter (PM) and hazardous air pollutants (HAPs) associated with each; and their potential impacts outside of Maricopa County. Based on direction from the Air Quality Strategies Task Force and the CO Subcommittee, the Fuels Subcommittee also proposed a task order to evaluate fuel formulation to reduce wintertime CO concentrations.

PROCESS

In order for the Subcommittee to accomplish its task within the required time, the ADEQ selected a contractor to identify prospective fuel formulations, conduct refinery modeling to assess refining costs, assess gasoline supply and distribution system impacts, and evaluate emissions changes expected for each fuel. The initial Subcommittee meetings focused on: 1) Developing a request for qualifications to narrow the list of qualified contractors; 2) Approving a scope of work; and 3) Developing task specific work orders for the selected contractor. MathPro, with Air Improvement Resource, Inc. as its subcontractor, was selected to prepare the report. After an initial briefing with the Subcommittee, the contractor provided progressive bi-weekly updates to the Subcommittee on work progress and issues. MathPro submitted its draft report on October 22, 1996, listing modeled emissions from each of the seven evaluated fuels, additional costs for fuel formulation and vehicle fuel economy, potential impacts on the distribution system, and potential spillover effects outside of the Maricopa Non-Attainment Area. The Final Report from the contractor (Attachment 2) was delivered to the Subcommittee on November 8, 1996.

In addition to the report from the contractor, the Subcommittee agreed that the Urban Airshed Modeling (UAM) being conducted by ADEQ be used to assess the ozone reduction potential of the fuel options. This analysis is important because ozone formation is a reversible photochemical process where NO_x can play the role of ozone creator and destroyer. UAM modeling conducted for the ozone attainment demonstration submitted to EPA by the State in November 1994, indicated that NO_x reductions could increase ozone concentrations. Since ADEQ is revising the 1994 UAM analysis, and the NO_x and VOC reductions expected from the fuel formulations are considerably different than those used for the NO_x sensitivity testing in 1994, it is necessary to reevaluate the sensitivity of ozone formation to changes in NO_x emissions. Preliminary information was presented to the Subcommittee on November 12, 1996, to assist the Subcommittee with making recommendations to the Air Quality Strategies Task Force. UAM is an ongoing effort, and the Subcommittee acknowledged that additional modeling for a 1996 ozone event may provide results that are different from the modeling provided to them. Regardless, the Subcommittee's recommendations are based on the modeling results available at the time this report was being prepared.

SCOPE OF WORK

In the development of the Scope of Work for the contractor, a number of major issues were identified as being essential components of the analysis to be included in the contractor's report:

Air Quality

- Emissions that contribute to ozone formation. Estimates of the per vehicle and nonattainment area-wide emissions impacts on CO, VOC and NO_x need to be documented. In addition, both non-road as well as on-road mobile source emissions need to be assessed.
- Emissions models. Several peer reviewed models need to be used to assess emissions. Rationales for all key assumptions and methods for estimating emissions need to be explicit.
- Ozone reduction potential of the fuels. Ozone formation is a complex and reversible process involving primarily VOC and NO_x emissions. UAM modeling is necessary in order to assess the relative ozone impacts of expected NO_x reductions associated with changes in gasoline formulations.
- Secondary emissions impacts. Alternative gasoline formulations are likely to have impacts on emissions of HAPs (toxics), particulates and particulate precursors. The potential emissions benefits and disbenefits need to be assessed.
- Non-season impacts. Some of the fuel formulations evaluated may be required year-round, or change the formulation of winter fuels. Potential wintertime emissions changes associated with the summertime formulations need to be identified.

Refining, Supply and Distribution Systems

- Refining. The contractor should assess existing refinery capability and anticipated changes in refineries serving the Maricopa County market, and modifications that may be necessary to meet new standards, including capital and other costs.
- Supply and distribution. The contractor should evaluate logistics of blending, storage and delivery of gasoline; and distribution system capital improvements and any changes to distribution and storage systems that may be necessary to provide alternative gasoline formulations.

Out of County Impacts

- The analysis needs to account for how changes in Maricopa County gasoline standards would affect the supply and cost of gasoline manufactured for the balance of the State, and, potentially, outside of Arizona.

Vehicle Operation and Maintenance Impacts

- Accessory impacts, including effects on gasoline mileage, and vehicle operation and maintenance need to be assessed.

Implementation

- Timeliness of providing the gasoline formulations is important, especially with respect to the ability of the refining centers to provide gasoline meeting the new specifications by the summers of 1997 and beyond.
- Both performance- and property-based standards for fuel formulations need to be analyzed.

- Costs to government and institutional capability should be taken into consideration for the options being considered.

Cost-Effectiveness / Cost vs. Price

- The contractor should estimate the total cost per gallon of refining, delivering and using each of the fuel formulations evaluated, and the total costs and the cost per ton of VOC reduced by each of the fuel formulations. The cost-effectiveness evaluation may be tempered based on the outcome of the UAM evaluation of NOx impacts on ozone formation.
- Since the price of fuel varies according to market factors such as competition; fuel availability and other factors, only the incremental cost of the producing and transporting the fuel, and potential changes in vehicle fuel economy should be addressed in the report.

Baseline

- The baseline used by the contractor for the analysis was derived from data submitted by refiners for June through August 1996, as required by the Governor's Revised Air Pollution Emergency Proclamation of July 17, 1996.

KEY ASSUMPTIONS AND LIMITATIONS OF THE STUDY

The Contractor's Report

Under this Scope of Work, MathPro and AIR, Inc. worked with the Fuels Subcommittee to produce the technical evaluation, *Assessment of Fuel Formulation Options for Maricopa County*, dated November 7, 1996 (Attachment 2). This report addressed most of the issues listed above. However, in the course of the analysis, the contractor made some major assumptions to facilitate this analysis, simplifying some of the inputs and modeling protocols. While these assumptions allowed the report to be finalized in a timely fashion, they have translated into limitations on the data and results of the report.

The following are the key assumptions and limitations of the contractor analysis:

- The baseline gasoline used to evaluate the fuels options was for summer 1996 (June through August).
- The study does not address the issue of gasoline prices.
- All costs would be assigned to summer months, even though capital costs and other expenses may be distributed throughout the year.
- Fuels are evaluated for summer season only, regardless of the requirements of some fuel options for year-round control of emissions (e.g. control of HAPs under the Federal RFG program).

- Refinery modeling was based on "notional" refineries, or refining centers. This assumes that all refineries in each center function as one refinery; that is to say that individual refineries in a refining center are capable of optimizing operations by sharing costs, crude stocks and blend stocks. While this is not strictly true, it allows for detailed refinery analysis that protects the propriety of individual refinery operations.
- Refiners will not reduce the quality of non-Maricopa County gasoline (quality shift) to help offset the cost of any new Maricopa County specific gasoline standard.
- The report made a simplifying assumption that gasoline supply patterns would not change under any of the fuel options.
- Emissions were evaluated using both the EPA Complex Model and the CARB Predictive Model.

Urban Airshed Modeling

- UAM modeling was based on August 1992 meteorology and 1999 inventory of emissions sources, and was conducted solely to test the sensitivity of the ozone formation process to changes in VOC and NOx emissions. Though additional refinements will be made in emissions inventories and a 1996 ozone event will eventually be modeled, the results of this continuing effort will not be available until after the completion of this report.

KEY CONCEPTS

In addition to the above assumptions and limitations, there are two technical concepts raised by the contractors' report which must be understood in interpreting its results:

Quality Shift and Excess Quality

Quality shift refers to the potential for refiners to comply with more stringent fuel standards in Maricopa County by allowing fuel quality to deteriorate in other locales. There is a regulatory limit to this potential degradation: anti-dumping requirements under the federal RFG regulations require refiners to maintain average conventional gasoline quality at a level equal to (or better than) their 1990 baseline gasoline quality. Within the bounds of compliance with these federal regulations, refiners have some flexibility to shift conventional gasoline characteristics.

Whether quality shifting will occur depends on four factors:

- 1) The economic benefit to be accrued by refiners as a result of the shift;
- 2) The limited regulatory flexibility available to refiners under federal anti-dumping constraints;
- 3) Each refiner's operational flexibility to produce and segregate multiple conventional gasoline grades; and,
- 4) Individual refiner's public policy and corporate responsibility positions.

Excess quality occurs when gasoline that is of higher quality than is necessary to meet regulatory standards is offered for sale. The usual cause of this occurrence is inadequate facilities for segregating gasolines that are destined for areas with different quality requirements, which drives refiners and suppliers to meet the more stringent of the requirements. If refiners should choose to deliver the reformulated fuel to outlying areas, those areas would receive quality in excess of what is required. The incremental cost of this excess quality would be borne by either the refiners or the consumers.

Types of Fuels Standards

There are generally two methods for regulating the quality of gasoline: property-based standards and performance-based standards. Property-based standards establish limits on certain gasoline parameters (e. g. vapor pressure), which is a simpler enforcement concept. Performance-based standards establish the desired emissions characteristics of the fuels, but allows refiners flexibility to vary individual properties of the gasoline to achieve the emissions reductions. For example, under Phase I of the federal RFG program, volatile organic compounds must be reduced by fifteen percent. California Phase 2 RFG is a combination of a property-based standard specifying limits on eight gasoline properties, but allowing refiners a performance based standard option based on a demonstration of estimated emissions performance equivalent to the property-based fuel.

Additionally, both of these types of standards, property- or performance-based, can be enforced on the basis that every gallon, or the average of production meet the required standard. Averaging provisions will tend to increase flexibility for refiners, while every-gallon standards allow simpler enforcement mechanisms. Downstream enforcement of averaged standards can be aided by the imposition of a cap on performance or properties. When enforcement is on an every gallon basis, refiners and blenders will tend to comply with a larger margin of safety to assure compliance.

These complexities for performance based standards present difficult methodological obstacles for modeling the economic impacts of these fuels. As an example, under the CARB Phase 2 reformulated gasoline program, refiners can elect to sell any fuel formulation that meets the emissions performance standards set by CARB provided the fuels do not exceed certain caps set on fuel properties. This degree of flexibility can reduce the costs to refiners. Because of time constraints, MathPro modeled CARB Phase 2 as a property-based standard enforced on an average basis. Federal RFG was modeled as a combination of averaged performance and property-based standards.

Due to time constraints, MathPro modeled only one "pure" performance-based standard, for illustration purposes, representing a 10% VOC reduction¹ with no change in NOx emissions. There may potentially be other performance-based standards that could be developed to achieve targeted emissions reductions shown by the fuels modeled in the report, but with potentially lower costs for refiners. The practical issues relating to their implementation - institutional capability, additional

¹ This performance option was modeled by MathPro assuming that each notional refinery covered would use the EPA Complex Model to reduce calculated VOC emissions by 10%, without changing NOx emission.

costs to government, timeliness of necessary rules and policies, ranges or limits on allowable fuel property values, compliance determination, and enforcement - demand additional attention.

Regardless of what type of fuel standards or type of fuel is chosen, the following key issues that require further evaluation are:

- Dealing with uncertainty associated with the laboratory testing methods;
- Determining the point or points of compliance - the refinery, the terminal, or the pump;
- Establishing penalties for noncompliance;
- Funding additional costs and capability necessary for the State to adequately enforce these standards;
- Acquiring the necessary resources for the regulatory agency; and
- Setting the schedule and process for rule making.

If averaging is allowed, consideration must be given to:

- Averaging periods and per-gallon maxima that will be enforced;
- Determination of compliance and noncompliance with averages;
- Reporting requirements necessary to verify and track compliance; and
- Certification of compliance documents (i.e. the responsible corporate officer).

If performance standards are implemented, it becomes necessary to:

- Set the regulatory baseline (refiner specific or industry average); and
- Select the emissions model to evaluate fuels.

ISSUES THAT COULD ARISE FOR SELECTION OF SPECIFIC FUELS

The Fuels Subcommittee has identified several areas which require further study or could not be fully addressed by the "notional refinery" approach used in the study. These are briefly listed below:

- Will there be changes to the supply and distribution system or pattern of supply not identified in the study?

- How long an implementation period is required? Can the emissions reductions be in place before 1999?
- Does the state of Arizona have the authority, or can it gain approval from EPA, to adopt the change?
- Must/could the fuel be offered for sale year-round?
- What are the additional administrative costs?

ESTIMATED ADDITIONAL GOVERNMENT COSTS

If gasoline standards change, the Arizona Department of Weights and Measures (ADWM), which is charged with regulating gasoline quality, will require additional resources, regardless of which fuel formulation or compliance method is adopted. Any infusion of additional resources will require some sort of legislative appropriation to ADWM. The following represents a preliminary estimate of the additional resources that may be necessary to enforce new gasoline standards.

Present costs of the gasoline regulation program are \$331,000, currently provided from the Air Quality Fee Fund, which pays for 3 full time equivalent (FTE) employees and \$99,900 for gasoline laboratory analysis on 2,887 gasoline samples, statewide. At present, the major laboratory analyses conducted are for distillation characteristics, RVP, octane [(R+M)/2], and oxygenate type and concentration. A limited number of samples are currently being tested for sulfur content.

At a minimum, additional costs for laboratory analysis will increase from \$37 per sample to \$79 per sample. This will require an additional \$57,162 for analysis of the 1,361 samples taken in Area A, plus \$16,170 if 25% of the balance-of-State samples are analyzed to monitor for quality shift; for a total of \$73,332.

If an averaging compliance method is chosen, one additional FTE will be necessary to manage reporting and compliance monitoring. Assuming that this FTE will be a State Grade 17 specialist, the additional annual cost will be approximately \$50,000, with one-time costs for purchase of equipment (including office setup) for that staff person, at approximately \$10,000. Other one-time costs that should be considered would be for contractors to assist ADWM with the rulemaking process and establishing the compliance reporting and monitoring systems, which is estimated at approximately \$50,000.

In summary, a preliminary estimate of additional annual costs for ADWM range from \$57,162 to \$123,332, with estimated one-time costs of approximately \$60,000.

CONCLUSIONS

- Any additional cost for fuel will provide adequate incentive to make investments in refining and supply and distribution systems to prevent continuation of quality "give-away".
- While the EPA Complex Model and the CARB Predictive Model calculated different emissions benefits for the fuel options, they did not change the rank order of effectiveness or cost-effectiveness of the fuels evaluated.
- All fuel options would increase the cost of producing and using fuel from 2.3 to 17.34 per gallon in the Maricopa County nonattainment area, except for the low RVP option, which has no net cost impact.
- Very limited benefits can be derived from further RVP reductions given the existing low RVP gasoline limit (7.0).
- Emission modeling indicates that the greatest VOC reductions come from CARB Phase 2 RFG, the 10% VOC performance standard, and federal RFG.
- Carbon monoxide, hazardous air pollutants, and to some extent, particulate pollution, would also be reduced by almost all fuel formulations examined. Greatest reductions would be from CARB Phase 2 and federal reformulated fuels.

The costs, emissions reductions and cost-effectiveness for all fuel formulations are summarized in Table 1 and Figures 1 and 2, in the Executive Summary. Table 2, below, provides summary data in short tons (Table 1 is in metric tons), if needed to assure consistency between emissions reductions and cost-effectiveness estimates used in descriptions of other control measures.

- Urban Airshed Modeling was used to evaluate emission reductions for a matrix representing some fuel formulations, using Phoenix meteorological conditions for a 1992 ozone event. Initial results show limited ozone reduction benefits (maximum two parts per billion) from fuel emission reductions, and by inference, any other control measures with similar VOC reductions. VOC and CO emissions reductions were beneficial; NO_x reductions demonstrated a direction toward increasing ozone levels. Additional UAM modeling is being conducted for a 1996 ozone event and using revised emissions inventories.
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- The cost-effectiveness of all other feasible ozone reduction measures, including non-road mobile sources, be considered using similar methodology (e.g. apportionment of capital recovery over the summer months only) and to the depth with which the Subcommittee evaluated the fuels.

TABLE 2: SUMMARY OF COST AND EMISSION REDUCTIONS IN TONS BY FUEL

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Negative numbers denote emissions increases.

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- Based on refinery cost and fuel efficiency losses.
- Emissions are for the ozone nonattainment area.
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SOURCE: Assessment of Fuel Formulation Options for Maricopa County, MathPro, Inc. and Air Improvement Resource, Inc. (ADEQ, 1996)

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ATTACHMENT #1

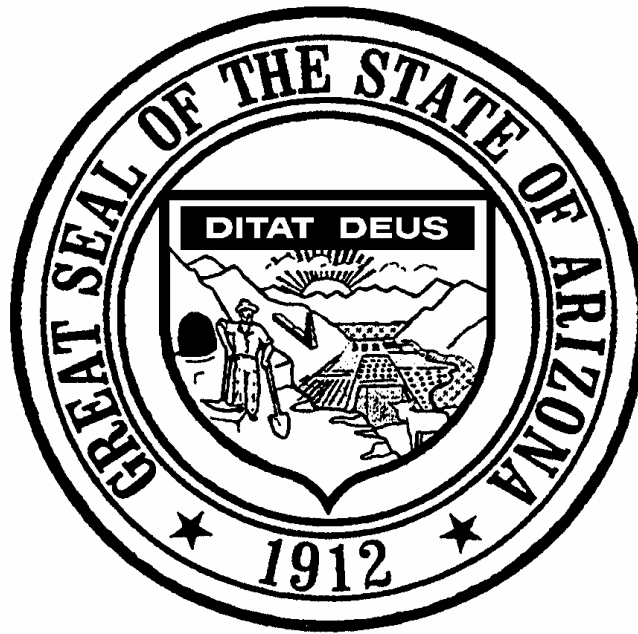
REPORT OF THE GOVERNOR'S OZONE
STRATEGIES TASK FORCE

SHORT TERM OZONE CONTROL OPTIONS FOR
THE MARICOPA COUNTY NONATTAINMENT AREA

JULY 1, 1996

**REPORT OF THE GOVERNOR'S
OZONE STRATEGIES TASK FORCE**

**SHORT TERM OZONE CONTROL OPTIONS
FOR THE MARICOPA COUNTY
OZONE NONATTAINMENT AREA**



Fife Symington, Governor

July 1, 1996

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CLEAN AIR CHALLENGE PROGRAM

Measure: The Clean Air Challenge is a joint effort by the Arizona Department of Environmental Quality and voluntary governmental & private company participants to avoid or reduce air pollutants and undertake other activities that will reduce the formation of ozone in the Maricopa County. Participants in this voluntary effort will agree to do one or more of the following:

- Achieve 15-20% above and beyond Trip Reduction Program goals at each site.
- Reduce ozone precursor chemical use by 10%.
- Reduce ozone precursor releases by 10% through alteration of work practices.
- Offer incentives to the public or employees for changing out gasoline-powered lawnmowers to electric models, or for replacing two-cycle lawn and garden equipment with four-cycle models.

Implementation: Agreements would be customized for each governmental entity's and company's circumstances and could include other measures on a case by case basis. Reporting would be done at least on an annual basis and would be spelled out in the final agreement between ADEQ and the governmental_entity or company.

Cost and Effectiveness: Depends on number, type, and amount of governmental entity or company participation. Cost born by governmental entity or company depends on individual circumstances. Benefits will be determined on an individual - participant basis. Allows governmental entities and companies to maximize reductions in the most cost effective manner.

Legal Authority: No new authority needed. Accountability for reductions will be established through reporting mechanisms_contained in the agreements.

DEFER EMISSIONS ASSOCIATED WITH GOVERNMENTAL ACTIVITIES

Measure: Require State agencies and its political subdivisions operating in the Maricopa County ozone nonattainment area to, where practicable, defer emissions from a variety of activities to reduce their contribution to ozone concentrations. Measures include, where feasible and appropriate:

- Prioritizing and rescheduling of painting, metal coating, refinishing, and other VOC emitting activities until after September 30, 1996;
- Minimizing use of two-cycle gasoline-powered lawn and garden maintenance equipment, or defer landscaping activities as well as painting, metal coating, refinishing and other VOC emitting activities until after 4:00 p.m. and,
- Scheduling gasoline-powered fleet refueling after 4:00 p.m. (exempting public safety, law enforcement, emergency services and other essential vehicles).

In addition. State agencies and political subdivisions could be required to include in all procurement solicitations a request for substitute products with lower or no VOC content.

Implementation: Provisions would need to be made to exclude essential activities and vehicles.

Cost and Effectiveness: Projects subject to existing contracts would need to be excluded to avoid penalties associated with changes or cancellation. Effectiveness depends upon degree of cooperation and interest by each affected State and local agency. Effectiveness will be determined by measuring methods to be implemented by ADEQ.

Legal Authority: This measure would require an amendment to the Governor's Air Pollution Emergency Proclamation.

ENHANCEMENTS TO THE TRAVEL REDUCTION PROGRAM

Mesure: To enhance the existing Maricopa County Travel Reduction Program (TRP) by encouraging and promoting the reduction of vehicle miles traveled (VMT) and air pollutants associated with travel required for ordinary business purposes.

Implementation: Employers currently under the TRP would be encouraged to include in their travel reduction plans methods by which employers will encourage and promote reductions in VMT, as well as the use of alternative fueled vehicles in business trips.

Reductions in business trip VMT and/or use of alternative fueled vehicles for such purposes would be recorded as part of the annual TRP Plan. Results will not affect any current TRP requirements that address commuter trips.

ADEQ and Maricopa County should coordinate with EPA to determine any requirements in order to obtain air pollutant reduction credits toward demonstrating attainment in the State Implementation Plan.

Cost and Effectiveness: Costs associated with this proposal could be included into existing efforts by applicable employers to meet TRP reduction targets for commuter trips. VMT and air pollutant reductions achieved by using alternative fueled vehicles for business trips would be recorded and reported periodically.

Legal Authority: A.R.S. §49-588 addresses commuter trips.

GASOLINE QUALITY PUBLIC INFORMATION

Measure: Provide general information to the public concerning gasoline supplied to Maricopa County to encourage the production of fuels that will provide a net ozone benefit.

Implementation: By July 15, 1996, and on the 15th day of each month thereafter until October 15, 1996, each refiner of motor fuel shipped to Maricopa County for distribution in Maricopa County or elsewhere in the state shall supply to ADEQ the specification data, as measured at the refinery, applicable to each batch of fuel shipped to Maricopa County during the preceding month. The specification data shall include Reid Vapor Pressure, the levels of sulfur, T50, T90, olefins, aromatics and oxygen and shall be determined in accordance with applicable ASTM test methods. The information provided shall be treated as confidential business information pursuant to A.R.S. §49-432. As soon as possible but within 30 days after the receipt of such data, ADEQ shall publish emissions characteristics of the fuel at the refinery based upon the results of the EP A Complex Model. The information published shall also include, for each supplier, a comparison of the emissions characteristics of the fuel shipped during the reporting period to the refinery 1990 baseline as reported to EPA in accordance with the Federal Reformulated Gasoline regulations. The published data shall be accompanied by the following qualification:

The emissions information provided in this report is based on fuel parameters measured at the refinery. It is common practice in the petroleum industry to commingle fuels from various refiners after the fuel has left the refinery but prior to the addition of proprietary fuel additives by individual petroleum companies and prior to the fuel's delivery to service stations for sale. Therefore, this information applies only to the quality of fuel leaving the refinery and not the quality of fuel purchased by consumers at the pump.

Cost and Effectiveness: The decision whether to produce a cost effective, cleaner burning fuel to further reduce ozone levels will rest with each refiner. Depending on such decision, the cost will vary for any refiner that choose to produce a cost effective cleaner burning fuel. The effectiveness will depend on whatever improvement in fuel quality a refiner may decide to achieve.

Legal Authority: ADEN, under ARS §49-432, has the ability to receive and protect information claimed as trade secret or, which, if revealed, would cause substantial harm to the competitive position of the party supplying the information. This proposal is consistent with the reporting requirements in the Governor's Air Pollution Emergency Proclamation of May 30, 1996, but will necessitate an amendment to those requirements.

INCREASE TRAVEL REDUCTION PROGRAM EFFECTIVENESS

Measure: To enhance the existing Maricopa County Travel Reduction Program (TRP) by:

- Increasing accountability by making publicly available and more widely disseminating the names of employers that meet or exceed their travel reduction target; and
- Creating a committee under the Manager of the TRP for Maricopa County to determine immediate measures that can be implemented to provide flexibility for companies to meet TRP targets prior to the effective date of legislation formally authorizing such flexibility.

Implementation:

- On a quarterly, semiannual or annual basis, names of high performing employers will be published in prominent newspaper advertisements and released to the media in press releases.
- The report will be due by August 1, 1996.
- The TRP Manager will, by July 15, 1996, establish this committee, which will consist of the Maricopa County TRP Task Force or other membership as determined by the Manager and the Task Force. Measures designed to improve emissions reductions by the TRP employers will be implemented as soon as practicable, pending passage of legislation and its implementation.
- Implementation of this measure will require an amendment to the Governor's Emergency Proclamation

Cost and Effectiveness: Effectiveness is unknown, and depends on the number of companies which could now comply with TRP emissions goals. Most costs are already mandated. This proposal could reduce costs by allowing businesses to meet program goals through other means. Though purchased advertising would be relatively expensive, press releases would impose minimal costs.

Legal Authority: No legal authority is necessary for publication of lists of high performing employers. Legislation will be necessary to authorize substitution of emissions control measures as substitutes for meeting current VMT reduction goals.

MARICOPA COUNTY NONATTAINMENT AREA FUEL SUBCOMMITTEE

Measure: ADEQ would chair a 13-person subcommittee, membership of which will be appointed no later than by July 15, 1996, appointed by the Chairman of the Governor's Ozone Strategies Task Force, to oversee research and make recommendations regarding the appropriate fuel composition to improve air quality in Maricopa County. A majority of the subcommittee shall be technical experts in the fields of refining, gasoline supply, or the impacts of fuels on Maricopa County air quality, and shall include representatives from outside of Maricopa County. Fuel composition and/or performance standards would be designed to maximize summer benefits, taking impact of the fuel on winter air quality into account, and would consider various options, including federal reformulated gasoline and California -reformulated gasoline fuels. Recommendations should consider benefits versus costs. The initial goal would be recommendations for the 1997 ozone season, but should also include long-term recommendations. The recommendations and report shall take into account the unique characteristics of the Maricopa County airshed. In addition, evaluation of the potential for erosion of fuel quality statewide and other concerns should be incorporated into the report. The deadline for the report from this subcommittee is October 10, 1996.

Implementation: ADEQ has set aside federal grant funds order to support a contractor necessary to provide independent expertise and analysis to the subcommittee. A schedule of -meeting dates will be prepared to coincide with critical deliverables from the contractor. In addition, regular reports from the subcommittee will be provided to the Task Force.

Cost and Effectiveness: _____ Mandatory fuel attributes have been identified as potentially benefiting Maricopa County air quality and may affect fuel costs statewide.

Legal Authority: No new authority needed. ADEQ has the ability to accept grants and donations to help fund the research.

OZONE REDUCTION OUTREACH PROGRAM

Measure: Immediate implementation of an Ozone Reduction Outreach Program (OROP) which will encourage *voluntary* measures by private individuals, businesses and all governmental entities located in Maricopa County. The OROP will contain the following elements :

- Increased promotion of the measures already included in the Ozone Lifestyles Program.
- Promotion of the voluntary measures described in the Enhanced Ozone Lifestyles Enhanced (see chart below) as well as additional voluntary measures listed below.
- Promotion of the Clean Air Challenge Program for Maricopa County large businesses and a similar challenge geared to the capabilities of small businesses.
- Promotion timing should be tied to an ADEQ performed forecast of weather conditions that are likely to foster the formation of elevated ozone concentrations during the next twenty-four hours, and issuance of an Ozone Advisory based upon that forecast.

Implementation There are two immediate implementation issues associated with the enhanced public education and information programs - cost and ability to implement in a timely manner. It has been estimated that a promotional program of the kind described here for the remaining period of the ozone season will cost at least one-half million dollars. The availability of funds at the level required both from governmental and private sources is presently unknown. Also unknown is the level of voluntary media cooperation that will occur. The Task Force recommends that an appropriation be sought of \$400,000 as a component of the legislation to be considered by the summer clean air Special Session and that other government funding sources and private contributions be solicited. What is known is that the mechanisms necessary to implement these proposals are currently in place and should be able to operate at or near the optimum level necessary to adequately reach the affected public within thirty days.

Businesses have already been recruited to participate in the Clean Air Challenge Program. It is expected that Valley chambers of commerce, Greater Phoenix Leadership and the Arizona Association of Industries will work cooperatively to promote the Challenge and to recruit participants. Assistance on product substitution will be provided on a business-to-business basis. Additional help on enhanced commuter and business trip reduction will also be available from Maricopa County and RPTA.

Predicting one day in advance, the ADEQ meteorologist will monitor for those weather conditions that foster the formation of ozone in the atmosphere. When the ADEQ meteorologist predicts that weather conditions will be favorable for the formation of ozone on the next day, ADEQ would issue an Ozone Advisory county-wide. The Ozone Advisory would be issued at 3:00 p.m. and be effective for a 24 hour period beginning at 12:00 a.m.

An Ozone Advisory will be released, requesting -announcement during the evening, night and early morning news broadcasts, ideally as part of weather reports. Training and securing the cooperation of weathercasters will be essential to the success of this effort. The Ozone Advisory would be announced along with suggested voluntary actions residents can take to help reduce the probability of the formation of ozone. The Arizona Department of Transportation will be requested to immediately post the Ozone Advisory utilizing the freeway electronic message boards and the freeway management system Home Page on the internet.

This Task Force requests a report from the Office of the Governor concerning progress implementing this measure at its August 14, 1996, meeting.

Cost and Effectiveness: The cost of the enhanced public education and information efforts is estimated at one half million to one million dollars. The effectiveness is difficult to predict in advance. However, given a limited number of measures that can be immediately implemented and the absence of few if any effective mandatory measures that can be imposed on private and non-state governmental entities in time to prevent ozone exceedances during the next ninety days, a comprehensive voluntary program is probably one of the few potentially significant options available in the short term.

No additional direct costs are expected to be associated with the Clean Air Challenge Program as this voluntary effort is already being supported by existing organizations.

ADEQ already has the capacity to conduct meteorological forecasting.

Legal Authority: Because it is voluntary, the legal authority issue should not arise. The only other issues of authority that are raised by the proposal is the availability of funds that can be legally used for implementation and whether the outside contractors required to implement the promotional campaign can be utilized immediately without running afoul of the governmental procurement process. The response to the first issue is that the magnitude of implementation is obviously tied to the availability of funding. The answer to the second question is that public relations and advertising firms are currently under contract that can be utilized for the implementation of the program potentially without having to suffer the delay from the competitive bidding process.

OZONE LIFESTYLES PROGRAM ENHANCEMENTS

Avoid Drive Through Lanes
Postpone Gasoline Refueling until After 4p.m.
Postpone Use of Lawn Equipment
Avoid Use of Lighter Fluid (in Favor of Self-Lighting Charcoal, Metal Chimneys and Electric Starters)
Avoid “Jack Rabbit” Starts and Excessive Idling
Partnership with Gasoline Suppliers to Provide Incentives for Evening Refueling
Partnership with Commercial Sectors and Sponsor “25-Cent Transit Days” to Increase Transit Awareness (Banks, High Tech, Sports Teams, Utilities)
Partnership with ASE-Certified Automotive Repair Shops to Sponsor Free Car Care Clinics to Provide Information and Free Diagnostics
Request that Industry Prioritize Painting, Metal Coating, Refinishing Activities to Reschedule Non-emergency Jobs until After 9/30/96 or, at a Minimum, Schedule such Activities After 4p.m.
Request that Industry Develop and Implement Plans to Minimize Use of Gas Powered Lawn and Garden Maintenance Equipment
Request that Industry Schedule Fleet Gasoline Refueling in the Later Afternoon, Unless Otherwise Necessary
Request that Industry Include in All Solicitations a Request for Substitute Products with Lower or No VOC Content
Request that Industries Limit Idling of Commercial Vehicles at Their Facilities
Request that Industries Provide Incentives for Their Employees to Not Drive to Lunch
Request that Everyone Use Their Newest Car or Truck Because Newer Vehicles Pollute Less
Educate Drivers on Habits that will Minimize Emissions (e.g. How to Take Advantage of Synchronized Traffic Lights)
Do Not Top Off your Gas Tank
When you Buy Gas, Buy a Full Tank
Encourage School Districts to Restrict Off Campus Trips by Students and Staff During the School Day

WARN PUBLIC AND PRIVATE SECTOR EMPLOYEES ABOUT NEXT-DAY CONDITIONS LIKELY TO PRODUCE HIGH OZONE

Measure: Presently, the Arizona Department of Transportation (ADOT) maintains a Freeway Management System Home Page on the Internet. This measure would involve using the existing Travel Reduction Program Coordinator for the employees covered under the Maricopa County Travel Reduction Program to check the Freeway Management System Home Page in the afternoon and then notify the employees of predicted next-day adverse ozone conditions and potential travel reductions and VOC emission reduction measures. Employees could then select appropriate measures to reduce VOC emissions and vehicle miles traveled.

Implementation: After ADEQ predicts that next-day conditions will be conducive to ozone exceedances they would advise ADOT to add the message to their Home Page. The measure could be implemented immediately through the existing network of Travel Reduction Coordinators and the existing ADOT Freeway Management System Home Page. The Internet address is <http://www.azfms.com>.

Cost and Effectiveness: No additional cost for employers with Internet access capabilities.

This measure could potentially reduce air pollution.

Legal Authority: The legal authority is in place through the Maricopa County Travel Reduction Ordinance.

ATTACHMENT #2

ASSESSMENT OF FUEL FORMULATION OPTIONS FOR MARICOPA COUNTY

FINAL REPORT
NOVEMBER 7, 1996

MathPro Inc.

FINAL REPORT

Assessment of Fuel Formulation Options for Maricopa County

for

**State of Arizona
Department of Environmental Quality**

performed under

Contract 97-0013AA

by

MathPro Inc.

P.O. Box 34404

West Bethesda, Maryland 20827-0404

with

Air Improvement Resource, Inc.

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November 7, 1996

EXECUTIVE SUMMARY

MathPro Inc. (prime contractor) and Air Improvement Resource, Inc. (sub-contractor) are pleased to submit this report to the Arizona Department of Environmental Quality (**ADEQ**), as the final work product of Task 1 under Contract 97-0013AA (August 9, 1996). The Scope of Work (SoW) for this task is shown in **Appendix A**.

We have prepared this report to support the work of the Fuels Subcommittee of the Arizona Air Quality Strategies Task Force (the Subcommittee). The report lays out the methodology, findings, and recommendations of our analysis of prospective gasoline formulations and standards aimed at decreasing vehicle emissions of volatile organic compounds (VOC) in Maricopa County in the Summer season (May 1 to September 30).

The report addresses six topics, each in its own section.

1. Proposed gasoline standards
2. The current gasoline supply situation in Maricopa County
3. Configuration and economics of the gasoline distribution system serving Maricopa County
4. Refining economics of the proposed gasoline standards
5. Estimated VOC and other emissions associated with the proposed gasoline standards
6. Assessment of the proposed gasoline standards

Technical Approach

We assessed six proposed gasoline standards in this study:

1. Federal RFG (Phase 1 now; Phase 2 starting in 2000) **(Phase 1 RFG) and (Phase 2 RFG)**
2. Federal RFG, with a waiver for $RVP \leq 7.0$ psi **(Phase 1 RFG & 7.0 RVP)**
3. California Phase 2 RFG **(California RFG)**
4. Conventional gasoline, with T50, T90, and sulfur control **(GEPAP)**
 $T50 \leq 220^{\circ} F$; $T90 \leq 339^{\circ} F$; $sulfur \leq 116$ ppm
5. Conventional gasoline, with $RVP \leq 6.5$ psi **(Low RVP)**
6. Performance Standard: ? VOC Emissions $\geq 10\%$ **(10% VOC Reduction)**

? NOx Emissions = 0%

The first five are specified in the SoW and are all *property-based* standards. We added the last one to introduce a *performance-based* standard into the set of options considered, as requested in the SoW.

Except for Options 1 and 2 (federal RFG), all of these gasolines -- including Option 3 (California Phase 2 RFG) -- would be *conventional gasolines* under the anti-dumping provisions of the federal RFG program.

The study had three primary elements: analysis of the *gasoline distribution system* serving Maricopa County; analysis of *refining economics*, with primary emphasis on the costs of producing the various fuel formulation options; and analysis of the changes in *vehicle emissions* associated with each of the fuel formulation options.

In the refining analysis, we considered three refining aggregates:

- ? **East** (denoting refineries in the West Texas/New Mexico refining center, supplying gasoline to Maricopa County by pipeline through El Paso and Tucson);
- ? **West** (denoting the Los Angeles refining center plus one refinery each from the Bakersfield and San Francisco refining centers, supplying gasoline to Maricopa County by pipeline from Los Angeles through Colton); and
- ? **Northwest** (denoting refineries in the Puget Sound refining center and, more generally, remote refineries (1) capable of producing conventional gasoline, California RFG, Maricopa County gasoline, or gasoline blendstocks and (2) situated to move gasoline or blendstocks to Los Angeles)

We aggregated the results associated with these refining aggregates to develop average incremental refining costs and average properties for the total Maricopa County gasoline pool, for each of the fuel formulation options. For this aggregation, we used weighting factors consistent with the sourcing of gasoline supplied to Maricopa County in 1995.

We conducted the emissions analysis using (1) the weighted average properties of the future Maricopa County gasoline pool, generated by the refining analysis for each fuel formulation option, and (2) the average properties of the baseline gasoline for the analysis: Maricopa County gasoline in the Summer 1996 season. We estimated the properties of this baseline gasoline using the Arizona Gasoline Quality Monitoring reports submitted by refineries producing gasoline meeting existing Maricopa County standards. The emissions analysis employed established,

peer-reviewed models: the EPA MOBILE5 a model for estimating vehicle fleet emissions, the EPA Complex Model for certifying federal RFG, and the California Predictive Model for certifying California RFG.

Key Results and Findings

The key findings with respect to the gasoline distribution system are:

- ? The gasoline distribution system is now supplying to Maricopa County, in routine operations, special gasolines -- in particular, gasolines meeting Maricopa County standards, as opposed to State-wide (or Pima County) standards.
- ? The existing distribution system has the capability to deliver the required volumes of special Maricopa County gasolines meeting any of the proposed standards (or indeed other standards, whether property-based or performance-based).
- ? The differences between Maricopa County and State-wide gasoline standards lead to spill-over and local give-away of "excess quality" (described in Section 3.5) in Maricopa County and in other areas. We estimate the cost of quality give-away in current operations to be approximately:

Summer season	0.2 ¢/gal	\$ 3 MM/season
Winter season	0.4-0.6 ¢/gal	\$ 6- 9 MM/season
Year-round	0.3-0.4 ¢/gal	\$ 9-12 MM/year

Quality give-away is a social cost, that is, a cost incurred by society as a whole. Allocation of the cost of quality give-away -- refiners vs. consumers, inside vs. outside Maricopa County -- is difficult, if not impossible, to determine.

- ? The estimated range of annual capital charges for the investments required to abate quality give-away is about \$7-11 MM/year, roughly the same as the estimated range of annual costs of quality give-away (indicated above). That is, the distribution system as a whole appears close to having an economic incentive to reduce or eliminate excess quality in the system, independent of any new gasoline standards for Maricopa County.
- ? Should these investments be made, the incremental cost of quality give-away assignable to the new Maricopa County standard would be the *difference* between (1) the current costs of quality give-away and (2) the annual capital recovery charges for the investments

to abate quality give-away. This difference is not significant relative to the refining and fuel economy costs associated with the various fuel formulation options.

The key findings with respect to refining economics and vehicle emissions are summarized in **Exhibit ES-1**.

Exhibit ES-1 shows the estimated cost effectiveness, in \$ per ton of VOC emission reduction (**\$/ton VOC**), of the fuel formulation options considered. The exhibit contains separate estimates of cost effectiveness for 1999 and 2010.

These estimates should be viewed as robust indicators of the relative costs and merits of the various fuel formulation options (not as precise assertions of costs or benefits). They offer a means of rank ordering of the various fuel formulation options, at least with respect to the technical and economic factors considered in this study.

The results summarized in Exhibit ES-1 indicate that

- ? The **GEPAP** and **Low RVP** options have favorable cost effectiveness values, but offer little in the way of VOC emission reductions.
- ? The federal RFG options, **Phase 1 RFG & 7.0 RVP** and **Phase 2 RFG**, and the **10% VOC Reduction** option offer the strongest combinations of VOC emission reductions and cost effectiveness -- before accounting for the possible neutralizing effects of the accompanying reduction in emissions of nitrogen oxides (NO_x) associated with the federal RFG options.
- ? The **California RFG** option offers the largest VOC emission reduction, but with cost-effectiveness inferior to the federal RFG and 10% VOC reduction options -- again before accounting for the possible effects of the accompanying NO_x reductions associated with California RFG.
- ? The choice of emission modeling methodology -- Complex Model vs. Complex/Predictive Models -- influences the magnitude of the estimated VOC emission reductions and the estimated cost effectiveness of the various fuel formulation options, but not their rank ordering with respect to these measures.
- ? The cost-effectiveness of each fuel formulation option decreases from 1999 to 2010. As time goes on, improvements in vehicle emission control technology and changes in the distribution of model years in the vehicle fleet progressively reduce engine exhaust emissions (with fuel properties constant). These trends reduce the magnitude of emissions reductions, in tons per day, that improvements in gasoline properties can yield.
- ? Carbon monoxide (CO) reductions could be equivalent to an additional 1-4 tons/day of VOC reductions, depending on the fuel formulation option. These estimated reductions follow from the CO emission reductions shown in Exhibit ES-1 and the accepted reactivity factor for CO as an ozone precursor (noted in Section 6.4). Fuel formulation options involving oxygenate blending show the largest reductions in CO emissions.

This last point indicates that clarifying the effect of CO emissions on ozone levels in Maricopa County in the UAM modeling work (along with the effect of NO_x emissions) would sharpen future assessments of various fuel formulation options for ozone control.

The results of this study indicate little or no impact of the various fuel formulation options on areas of Arizona outside of Maricopa County.

As noted above, the gasoline distribution system serving Maricopa County may now have (or be close to having) an economic incentive to abate the costs of spill-over and local quality give-away that the system now incurs. Any new gasoline standard for Maricopa County would increase that incentive.

Moreover, the Subcommittee has adopted the position that, after adoption of a new gasoline standard for Maricopa County, refiners would produce Maricopa County gasoline to the new standard in a manner such that areas in Arizona outside Maricopa County would experience no decrease in the emissions performance of the gasoline that they received.

Finally, further analysis might identify one or more performance-based standards tailored to Maricopa County's requirements that would (1) yield substantial VOC emission reductions (with the desired change in NO_x emissions) and (2) be less costly and more cost-effective than property-based standards or performance-based standards developed for other circumstances (e.g., Federal RFG and California RFG standards).

ATTACHMENT #3

TASK ASSIGNMENT PROPOSAL SCOPE OF WORK: WINTERTIME FUEL STANDARDS

**TASK ASSIGNMENT PROPOSAL SCOPE OF WORK:
WINTERTIME FUEL STANDARDS**

Overview: The Arizona Department of Environmental Quality (ADEQ) has hired a consultant to provide independent expertise and analysis to the Maricopa County Nonattainment Area Fuels Subcommittee of the Governor's Ozone Strategies Task Force. The primary charge of the consultant is to prepare a report, under the direction of the Subcommittee, that will evaluate options for modifying gasoline formulation for the purposes of reducing carbon monoxide (CO) pollution in Maricopa County. Fuel composition and/or performance standards will be designed to provide winter benefits, taking the impact of fuel on summer air quality into account, and consider various options, including Federal Reformulated Gasoline with a waiver to allow oxygenation up to 3.7% oxygen by weight, controls on gasoline distillation characteristics and sulfur content. The report should take into account the unique characteristics of the Maricopa County airshed, refining and delivery system capacity and logistics, cost, cost-effectiveness, and spillover costs and benefits (e.g., impacts outside of Maricopa County, non-CO reduction related benefits and disbenefits).

Tasks:

Task 1: Identification of Fuels Formulations and Regulatory Options:

The contractor shall investigate the range of options available for changing gasoline formulations that will reduce emissions of CO during the winter months. The options shall include:

- a) Implementation of the Federal Reformulated Gasoline Program, with a waiver to allow oxygenation up to 3.7% oxygen by weight;
- b) Caps on T50 and T90;
- c) Caps on sulfur content;
- d) Emissions based performance standards that allow averaging;
- g) Other market based incentives (CARB Phase II) including banking and trading of credits;
and
- h) Other regulatory options that may be feasible.

The discussion of each of these options shall also include a treatment of:

- a) Timeliness of implementation with respect to ability to affect emissions reductions

- during the winter season of 1998-1999 and 1999-2000, and future years, through 2010;
- b) Regulatory issues that may affect implementation, including state and federal environmental and energy regulations, and the existence of potentially overlapping and conflicting statutes and regulations;
 - c) Implementation issues, including adequacy of existing regulatory institutions and staffing, necessary statutory and regulatory changes, and the impact on demands on government and regulated industries; and
 - d) Any historical experience with these or similar options, with respect to feasibility, implementation issues, and economic and emissions impacts.

Task 2: Analysis of Impacts on Gasoline Distribution and Effects on Vehicle Performance, Maintenance and Repair

The contractor shall assess the feasibility and impacts of each option identified in Task 1 with respect to:

- a) Logistics of blending, storage and delivery of gasoline;
- b) Distribution system capital improvements and any changes to distribution and storage systems that may be necessary;
- c) Added distribution costs per gallon of gasoline;
- d) Costs to government and other institutions;
- e) Ability to implement by October 1998 or 1999 and in the future through 2010, including necessary lead times;
- f) Potential supply and distribution impacts outside of Maricopa County in Arizona and outside Arizona; and
- g) Other aspects, including potential impacts on vehicle performance, maintenance and repair.

Task 3: Technical and Economic Analysis of Gasoline Production

The contractor shall estimate the feasibility and economic impacts of each option defined in Task 1, along with other formulations that are based on modified existing or new standards for fuel parameters, including distillation curve standards, RVP, and levels of sulfur, olefins, aromatics and oxygen with respect to:

- a) Existing refinery capability and anticipated changes in refineries serving the Maricopa County market, and modifications that may be necessary to meet new standards;
- b) Total costs with respect to cost of components of modified formulations;
- c) Refining costs per gallon of gasoline, and potential fuel economy impacts;
- d) Costs to government and other institutions;
- e) Ability to implement by October 1998 or 1999 and in the future through 2010, including necessary lead times;
- f) For Maricopa County only, estimated of cost-effectiveness in terms of dollars per ton of CO reduced; and
- g) Impacts on the balance of the State (outside Maricopa County) and outside Arizona.

Task 4: Emissions Analysis

The contractor shall assess the emissions impacts of each option identified in Task 1 using established, peer reviewed models and analytical methods, as follows:

- a) Estimation of CO emissions impacts on a per-vehicle basis, within major vehicle technology classifications (e.g. pre-pollution control, catalyst/air injection, closed loop);
- b) Estimation of region-wide emissions impacts with respect to on-road and non-road mobile source inventories for CO in Maricopa County for the years 2000 and 2010; and
- c) Secondary emissions impacts shall be assessed, including , particulate matter and its precursors, hazardous air pollutants(primarily aldehydes, benzene and butadiene), a brief literature review regarding possible health impacts of modification of fuel formulations (e.g., addition of oxygenates), and effects on emissions outside of Maricopa County.
- d) ADEQ shall provide Contractor all necessary data relating to modeling assumptions, emissions inventories, and other information needed to characterize emissions in Maricopa County.

Task 5: Conclusions

The contractor shall identify all options that are technically and logistically feasible and compare them with respect to total costs, cost-effectiveness (in accordance with Task 3, paragraph [f]), and spillover benefits and disbenefits. Conclusions shall also identify caveats with respect to unknowns.

Standards:

The draft and final reports shall:

- a) Include a cover page, executive summary of three pages or less, a table of contents, and lists of figures and tables, and technical appendices;
- b) Cite sources of information, using end notes for each chapter;
- c) Provide detailed descriptions of methods used for analysis in either the text or a technical appendix, including identification of all models and analytical techniques, explicit and implicit assumptions, and reliability/precision/accuracy of the method. Where non-proprietary models are used, program code or spreadsheet formulae shall be provided in printed form as part of a technical appendix; and
- d) Contractor shall provide 50 copies of the Final Report, 1 unbound master, and an electronic copy of the report in WordPerfect 6.1 for Windows format on 3.5" floppy diskettes. In addition, contractor shall provide on 3.5" floppy diskettes, copies of all spreadsheets and nonproprietary models used for the analyses conducted to produce the report.

SPECIAL INSTRUCTIONS

1. Confidentiality: Contractor shall take all precautions necessary and exercise due diligence to protect and not divulge information that is declared by a source as constituting either a trade secret or information likely to cause substantial harm to the competitive position of its client or company (See ARS §§ 49-201(31) and 49-432(C)(1), attached). Contractor shall not accept information considered by its source to be confidential unless it is clearly identified as such either on transmittal correspondence or on the documents themselves. An example of an adequate declaration appears below. All such information shall be maintained in a secured file, and shall be hand delivered to ADEQ in a sealed package clearly marked as being confidential.

Example confidential information declaration:

"Pursuant to ARS §49-432(C)(1), I declare this information as constituting either a trade secret or information that, if disclosed, is likely to cause substantial harm to the competitive position of this company.

_____"
Signature

2. Please submit Pricing Schedule that specifies Key Personnel, amount of hours needed to complete each Task, price per hour, and total cost for the Task Assignment. Please add travel expenses as a separate line. Prices shall be all inclusive with the exception of travel expenses as specified in contract.

SCHEDULE OF DELIVERABLES

DELIVERABLE	DATE
Meeting with the Subcommittee for discussion of issues related to the scope of work.	
Progress Report #1 - Presentation on method of approach, data needs; preliminary list of options.	
Progress Report #2 - Draft Task 1 chapters; preliminary draft Tasks 2 and 3 chapters; additional data needs.	
Progress Report #3 - Draft Tasks 2 and 3 chapters; preliminary draft Task 4 chapters.	
Progress Report #4 - Preliminary draft final report.	
Draft Final Report.	
Final Report.	

Contractor shall provide the Subcommittee 20 copies of all written materials with each progress report, and shall deliver an oral presentation that includes a review of all aforementioned written materials.

APPENDIX E
LIST OF ACRONYMS

LIST OF ACRONYMS

AAC	Arizona Administrative Code
ACLPI	Arizona Center for Law in the Public Interest
ADA	Arizona Department of Agriculture
ADEQ	Arizona Department of Environmental Quality
ADOT	Arizona Department of Transportation
ADWM	Arizona Department of Weights and Measures
ALAPCO	Association of Local Air Pollution Control Officials
ANPRM	Advance Notice of Proposed Rule Making
AQD	Air Quality Division
ARS	Arizona Revised Statutes
BACM	Best Available Control Measures
CAA	Clean Air Act
CAAG	Central Arizona Association of Governments
CARB	California Air Resources Board
CFR	Code of Federal Regulation
CO	carbon monoxide
CTG	control techniques guidance
EPA	Environmental Protection Agency
FIP	Federal Implementation Plan
FTE	full-time employee
FTP	Federal Test Procedure
HAPs	hazardous air pollution
HB	House Bill
HC	hydrocarbons

Acronym List (continued)

HDDV	heavy-duty diesel vehicles
hp	horsepower
HPA	High Air Pollution Advisory
IM	inspection and maintenance
JLBC	Joint Legislative Budget Committee
MAG	Maricopa Association of Governments
MCESD	Maricopa County Environmental Services Department
MVD	Motor Vehicle Department
NAAQS	National Ambient Air Quality Standards
NAMS	National Air Monitoring System
NAPs	Nonattainment Area Plans
NO _x	nitrogen oxide
NRCS	Natural Resource Conservation Service
PM	particulate matter
PM ₁₀	particulate matter with aerodynamic diameter of 10 microns and smaller
ppm	parts per million
psi	pounds per square inch
PSD	prevention of significant deterioration
RACM	reasonably available control measures
RACT	reasonably available control technology
RFG	reformulated gasoline
RPTA	Regional Public Transportation Authority
RVP	Reid Vapor Pressure

Acronym List (continued)

SB	Senate Bill
SBEAP	Small Business Environmental Assistant Program
SCAQMD	South Coast Air Quality Management District
SIP	State Implementation Plan
SOVs	single occupancy vehicles
STAPPA	State and Territorial Air Pollution Program Administrators
TPD	tons per day
TRPs	travel reduction programs
TSP	total suspended particulate matter
UAAEO	University of Arizona Agricultural Extension Office
$\mu\text{g}/\text{m}^3$	micrograms per cubic meter
USDA	United States Department of Agriculture
UV	ultraviolet
VEOP	Voluntary Early Ozone Plan
VMT	vehicle miles traveled
VOCs	volatile organic compounds
VVR	voluntary vehicle retirement
WSPA	Western States Petroleum Association